

**MOORE COUNTY SOLAR
DRAFT ENVIRONMENTAL IMPACT STATEMENT**
Moore County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
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COVER SHEET

Moore County Solar

Proposed action: Tennessee Valley Authority (TVA) proposes to execute a power purchase agreement, subject to satisfactory completion of all applicable environmental reviews, with SR Tullahoma, LLC (SR Tullahoma) for the power generated by the proposed 200-megawatt (MW) alternating current (AC) solar photovoltaic (PV) facility, known as Moore County Solar, in Moore County, Tennessee. The proposed solar facility would be connected to the TVA electrical transmission system by TVA and constructed, operated, and eventually decommissioned by SR Tullahoma.

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Lead agency: Tennessee Valley Authority

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Abstract:

In order to meet customer demand for increased renewable generation, TVA proposes to execute a power purchase agreement with SR Tullahoma to purchase 200 MW AC of power generated by a proposed solar PV facility called Moore County Solar, located two miles west of the city of Tullahoma, within the metropolitan government limits of Lynchburg in Moore County, Tennessee. The solar facility would occupy approximately 1,430 acres of a 3,463-acre Project Site that is predominantly forested. Associated actions include the construction of an electrical substation and switchyard on the Project Site and the interconnection of the facility to an existing TVA transmission line that extends north-south through the site. SR Tullahoma would construct, operate, and maintain the facility for a 20-year period. This Environmental Impact Statement evaluates the environmental impacts of the Proposed Action, i.e., the construction, operation, maintenance, and decommissioning of Moore County Solar, and the No Action Alternative, under which SR Tullahoma would not develop a solar facility in this location, and TVA would meet customer renewable energy demand through other actions.

SUMMARY

Purpose and Need for Action

In June 2019, the Tennessee Valley Authority (TVA) completed an Integrated Resource Plan (IRP) and associated Environmental Impact Statement (EIS) to determine how TVA will meet the demand for electricity in its service territory over the next 20 years, while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy with fewer environmental impacts (TVA 2019a). The 2019 IRP recommends the expansion of solar generating capacity of up to 14 gigawatts by 2038, depending on the level of load growth and other factors. TVA proposes to execute a power purchase agreement (PPA) with SR Tullahoma, LLC (SR Tullahoma) to purchase 200-megawatt (MW) alternating current (AC) of power generated by a proposed solar photovoltaic (PV) facility called Moore County Solar, to help fulfill the renewable energy goals established in the 2019 IRP.

Alternatives

In this EIS, TVA assesses a No Action Alternative and a Proposed Action Alternative. Under the Proposed Action Alternative, TVA would purchase 200 MW AC of power generated by Moore County Solar, a proposed solar PV facility located within the metropolitan limits of Lynchburg in Moore County, Tennessee, through a 20-year PPA with SR Tullahoma. The solar facility would occupy approximately 1,430 acres of a 3,463-acre Project Site that is predominantly forested, with some open agricultural areas. The facility would connect to TVA's existing adjacent Franklin–Wartrace No. 2 161-kilovolt (kV) transmission line (TL), which extends north-south through the Project Site. To interconnect to TVA's existing electrical grid, SR Tullahoma and TVA would build an on-site 161-kV substation and switchyard, respectively, and TVA would replace the existing overhead ground wire with new fiber-optic overhead ground wire along an approximately 9.8-mile portion of the TL. SR Tullahoma would own, maintain, and operate the facility for up to a 20-year period, at which point decommissioning efforts would proceed or additional operating options would be considered. During the operation of the solar facility, SR Tullahoma would maintain a herd of sheep within temporarily fenced paddocks within the Project fencing to help control the growth of tall vegetation, reduce mowing needs and risk of erosion, and help maximize plant and animal diversity.

Under the No Action Alternative, SR Tullahoma would not develop a solar facility in this location, and TVA would meet its renewable energy demand through other actions.

Affected Environment

The proposed solar PV facility would be located along Lynchburg Highway approximately two miles west of the city of Tullahoma, within the metropolitan government limits of Lynchburg in Moore County, Tennessee. The Project Site consists of flat to gently sloping forested land, much of which has been recently harvested, along with some wetland areas, croplands, and early successional fields. Rural single-family homes and small rural-residential concentrations surround the Project Site while some commercial and industrial developments are adjacent to highways that bisect or bound the Project Site. Several local roads, along with larger state roads and U.S. highways, provide access to the Project Site.

Current land uses include forest management with timbering operations and limited row cropping. The Project Site is underlain by both the surficial aquifer system and the Mississippian Carbonate Aquifer. Ponds, wetlands, three named streams (North Fork Blue Creek, West Fork Rock Creek, and Hurricane Creek), and numerous unnamed streams associated with two watersheds are present on the Project Site. These habitats support a variety of terrestrial and

aquatic species. Approximately 69.3 percent of the Project Site is composed of soils designated as prime farmland or farmland of statewide importance.

A total of 26 archaeological resources, consisting of eight archaeological sites and 18 isolated finds, were identified on the Project Site, and all of these were recommended as not eligible for listing on the National Register of Historic Places (NRHP) due to lack of integrity, significance, or both. One of these sites is a historical cemetery. The Project Site is situated on the World War II-era Motlow Range, an auxiliary training area for Camp Forrest. Motlow Range contained a series of firing ranges for light artillery, mortars, and machine guns and was decommissioned in 1946. The portion of Motlow Range within the Project Site does not contain mid-twentieth century deposits and is not considered eligible for the NRHP. A total of 12 architectural resources were identified on the Project Site or in the immediate vicinity. These consist of a former military training range (Motlow Range, also recorded as an archaeological site), the ruins of a mineral springs resort, two cemeteries (one of which is on site, the Old Jabel Ray Homeplace Cemetery, and was also recorded as an archaeological site), and two road corridors.

The Project is located in the Interior Plateau Level III ecoregion, and the Project Site is more specifically within the Eastern Highland Rim Level IV ecoregion. In the Project Site, the Eastern Highland Rim typically exhibits deep soils that support intensive row crop agriculture. Many of the flat areas on the Project Site that support wet deciduous forest fit the concept of the globally rare plant community Willow Oak - White Oak / Black Highbush Blueberry - (Possumhaw) / Barratt's Sedge Wet Forest community. This rare forest type is only found in the Eastern Highland Rim of Tennessee in the vicinity of Tullahoma. Eight state-listed plant species occur on the Project Site: Barratt's sedge, button sedge, dwarf sundew, slender blue flag, black footed quillwort, Virginia chain fern, iris leaved yellow-eyed grass, and Tennessee feather bells. Tennessee feather bells only occur in the state of Tennessee and are considered globally imperiled and at high risk for extinction. The Tennessee feather bells and slender blue flag were observed in portions of the TL ROW maintained as grassland and herbaceous habitats and where TL upgrades are anticipated. An undescribed species of borrowing crayfish of very limited distribution and the state-listed flame chub were observed in streams on the Project Site.

A total of 30 U.S. Army Corps of Engineers (USACE)-jurisdictional perennial or intermittent streams, 16 USACE-jurisdictional ephemeral streams, 18 USACE-jurisdictional wetlands, and three USACE-jurisdictional open waters (ponds) were documented on the Project Site. The Project Site also includes the following non-USACE-jurisdictional waters: 20 ditches (also called wet weather conveyances), four open waters, and 11 wetlands. These waters are regulated by Tennessee Department of Environment and Conservation (TDEC). Five USACE-jurisdictional streams, two USACE-jurisdictional wetlands and five non-USACE-jurisdictional ephemeral streams that are regulated by TDEC occur in the TL upgrade locations.

Environmental Consequences

Overall, with the implementation of minimization and mitigation efforts, environmental consequences associated with the Proposed Action Alternative would be minor to moderate.

During construction, minor, temporary increases to noise, traffic, and health and safety risks, as well as minor, temporary effects to air quality, greenhouse gas emissions, visual aesthetics, and utilities would occur. Construction and operations would have minor, localized effects on soil erosion and sedimentation and minor, beneficial, and indirect effects to surface waters and wetlands, floodplains, and aquatic life. Adverse effects would be minimized or mitigated by implementation of best management practices (BMPs) and specific mitigation measures. Following construction, the Project Site would be revegetated and maintained as a meadow with

a mix of perennial and annual grasses and forbs to attract pollinators and serve as fodder for grazing sheep in the fenced areas of the Project. Beneficial effects to socioeconomics would also occur with construction and operation of the Project.

Impacts to USACE-jurisdictional waters would be occur to 490 linear feet of jurisdictional ephemeral streams for driving of pilings to support the solar array. These impacts and others identified in the course of Project planning would be subject to Clean Water Act (CWA) Section 404 permitting by USACE. Based on the current layout, permanent fill for a road crossing and driving of solar array pilings would impact 1.4 acres of Tennessee Department of Environment and Conservation (TDEC)-jurisdictional wetlands on the Project Site. These impacts and others identified in the course of Project planning would be subject to CWA Section 401 permitting by TDEC. Mitigation may be required for these impacts to surface waters and wetlands.

The Project would change land uses on the Project Site from primarily forest management with timbering operations and some agricultural activities to industrial uses. Regenerative agricultural practices planned in association with the Project (i.e., sheep operations) would allow for some agricultural uses to continue to occur on site. These would partially offset the primary change of land use to industrial uses.

Approximately 780 acres of trees and shrubby vegetation, representing 37 percent of the forested areas on the Project Site would be removed. Some buildings have the potential to be removed as a result of the Project. Limited trimming and limbing of trees along access roads may occur for the TL upgrades. Surface waters offer foraging habitat and sources of drinking water for federally protected bat species within and adjacent to the Project Site, and these would mostly be avoided by the Project and protected with vegetated avoidance buffers.

The Project would avoid sensitive Willow Oak - White Oak/Black Highbush Blueberry - (Possumhaw) / Barratt's Sedge Wet Forest communities; the occurrences of state-listed plants, including Tennessee feather bells; the undescribed borrowing crayfish; and the locations where the state-listed flame chub was observed. As an environmental enhancement measure, TVA and SR Tullahoma would develop conservation plans that complement SR Tullahoma's regenerative agricultural model and would have the beneficial effects of both protecting and restoring on-site globally rare plant and aquatic communities and populations. Overall, because the impacts to federally listed and state-listed species would be avoided or minimized, effects to threatened and endangered plants and rare aquatic species would be minor. TVA is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act on potential effects to federally listed species.

Due to forested screening and its distance of 0.2 to 0.5 miles from the Project Site, the Project would not adversely affect the NRHP-eligible Motlow House, located adjacent to the Project Site. The Project would avoid the Old Jabel Ray Homeplace Cemetery by a minimum 250-foot avoidance buffer and, thus, not visually affect the cemetery. TVA is consulting with the Tennessee Historical Commission and federally recognized Indian tribes under Section 106 of the National Historic Preservation Act regarding these findings and avoidance measures.

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Symbols, Acronyms, and Abbreviations

AADT	Annual average daily traffic
AC	Alternating current
ACS	American Community Survey
AFB	Air Force Base
AEDC	Arnold Engineering Development Complex
AMSL	Above mean seal level
APE	Area of Potential Effect
ARAP	Aquatic Resource Alteration Permit
BG	Block group
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO ₂	Carbon dioxide
CO	Carbon monoxide
CT	Census Tract
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted decibels
DBH	Diameter at Breast Height
DC	Direct current
DREMC	Duck River Electric Membership Corporation
DWR	Division of Water Resources
EA	Environmental Assessment
EFO	Environmental Field Office
EIS	Environmental Impact Statement
EMF	Electromagnetic field
EO	Executive Order
ESA	Endangered Species Act
°F	Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
GHG	Greenhouse gas
HUC	Hydrologic unit code
IPaC	Information for Planning and Consultation
IRP	Integrated Resource Plan
kV	Kilovolt
L _{dn}	Day-night average sound level
LF	Linear feet
MBTA	Migratory Bird Treaty Act
MPT	Main power transformer
MVT	Medium voltage transformer
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database

NRHP	National Register of Historic Places
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
NWP	Nationwide Permit
O ₃	Ozone
OHGW	Overhead ground wire
OPGW	Fiber-optic overhead ground wire
OSHA	Occupational Safety and Health Administration
PGA	Peak ground acceleration
PM _{2.5}	Particulate matter whose particles are less than or equal to 2.5 micrometers
PM ₁₀	Particulate matter whose particles are less than or equal to 10 micrometers
PPA	Power purchase agreement
PPE	Personal protective equipment
PRT	Potential roost trees
PV	Photovoltaic
RNHD	Regional Natural Heritage Database
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably Foreseeable Future Action
SHPO	State Historic Preservation Office
SO ₂	Sulfur dioxide
SPCC	Spill Prevention, Countermeasure and Control
SR	State route
SRC	Silicon Ranch Corporation
SWPPP	Stormwater Pollution Prevention Plan
TAC	Tennessee Administrative Code
TCA	Tennessee Water Quality Control Act (Tennessee Code Annotated)
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
THC	Tennessee Historical Commission
TL	Transmission line
TVA	Tennessee Valley Authority
TVARAM	TVA Rapid Assessment Method
TWRA	Tennessee Wildlife Resources Agency
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WQC	Water Quality Certification

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

As part of its diversified energy strategy, Tennessee Valley Authority (TVA) produces or obtains electricity from a diverse portfolio of energy sources, including solar, hydroelectric, wind, biomass, fossil fuel, and nuclear. In June 2019, TVA completed an Integrated Resource Plan (IRP) and Environmental Impact Statement (EIS). The 2019 IRP, which updated the 2015 IRP, identified the various resources that TVA intends to use to meet the energy needs of the TVA region over a 20-year planning period, while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy with fewer environmental impacts (TVA 2019a). The 2019 IRP recommends the expansion of solar generating capacity of up to 14,000 megawatts (MW) by 2038.

TVA proposes to execute a power purchase agreement (PPA), subject to satisfactory completion of all applicable environmental reviews, with SR Tullahoma, LLC (SR Tullahoma), a wholly owned subsidiary of Silicon Ranch Corporation (SRC), to purchase power from a solar photovoltaic (PV) facility known as Moore County Solar with a generating capacity of approximately 200 MW alternating current (AC). Under the PPA, SR Tullahoma would construct, operate, and maintain Moore County Solar for up to a 20-year period. Together, these actions are referred to as the Project or Proposed Action. The Project would partially fulfill the renewable energy goals established in the 2019 IRP by providing cost-effective renewable energy. This EIS describes the potential environmental effects associated with constructing, interconnecting, operating, maintaining, and decommissioning Moore County Solar on a 3,463-acre Project Site in Moore County, Tennessee.

1.1 Background and Introduction

TVA is a self-financed, wholly owned corporate agency of the United States (U.S. or US) that serves a region comprising portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. As a public power entity, TVA has no shareholders and receives no appropriated funding. Under the TVA Act of 1933, as amended, Congress charged TVA with advancing the social and economic well-being of the residents of the Tennessee Valley region. The target power supply mix adopted by TVA in the 2019 IRP envisions solar generating capacity additions between 1,500 and 8,000 MW by 2028, and up to 14,000 MW by 2038, depending on load growth and other factors.

Components of the Proposed Action include SR Tullahoma's construction, operation, maintenance, and eventual decommissioning of the approximately 200-MW AC solar PV facility, known as Moore County Solar, on the Project Site. During the operation of the solar facility, SR Tullahoma would maintain a herd of sheep on the Project Site to help control the growth of tall vegetation and reduce mowing needs. The Project would connect to the existing adjacent TVA Franklin–Wartrace No. 2 161-kilovolt (kV) transmission line (TL) that extends north-south through the Project Site. To interconnect to the existing electrical grid, SR Tullahoma and TVA would build an on-site 161-kV substation and switchyard, respectively, and TVA would replace the existing overhead ground wire (OHGW) with new fiber-optic overhead ground wire (OPGW) along a 9.8-mile portion of the TL that extends into Coffee and Franklin counties (referred to herein as the TL upgrade locations). The Project Site is located along Lynchburg Highway approximately two miles west of the city of Tullahoma, within the metropolitan limits of Lynchburg in Moore County, Tennessee.

(Figure 1-1). The Project Site is mostly forested land, much of which has been recently harvested, along with some wetland areas, croplands, and early successional fields.

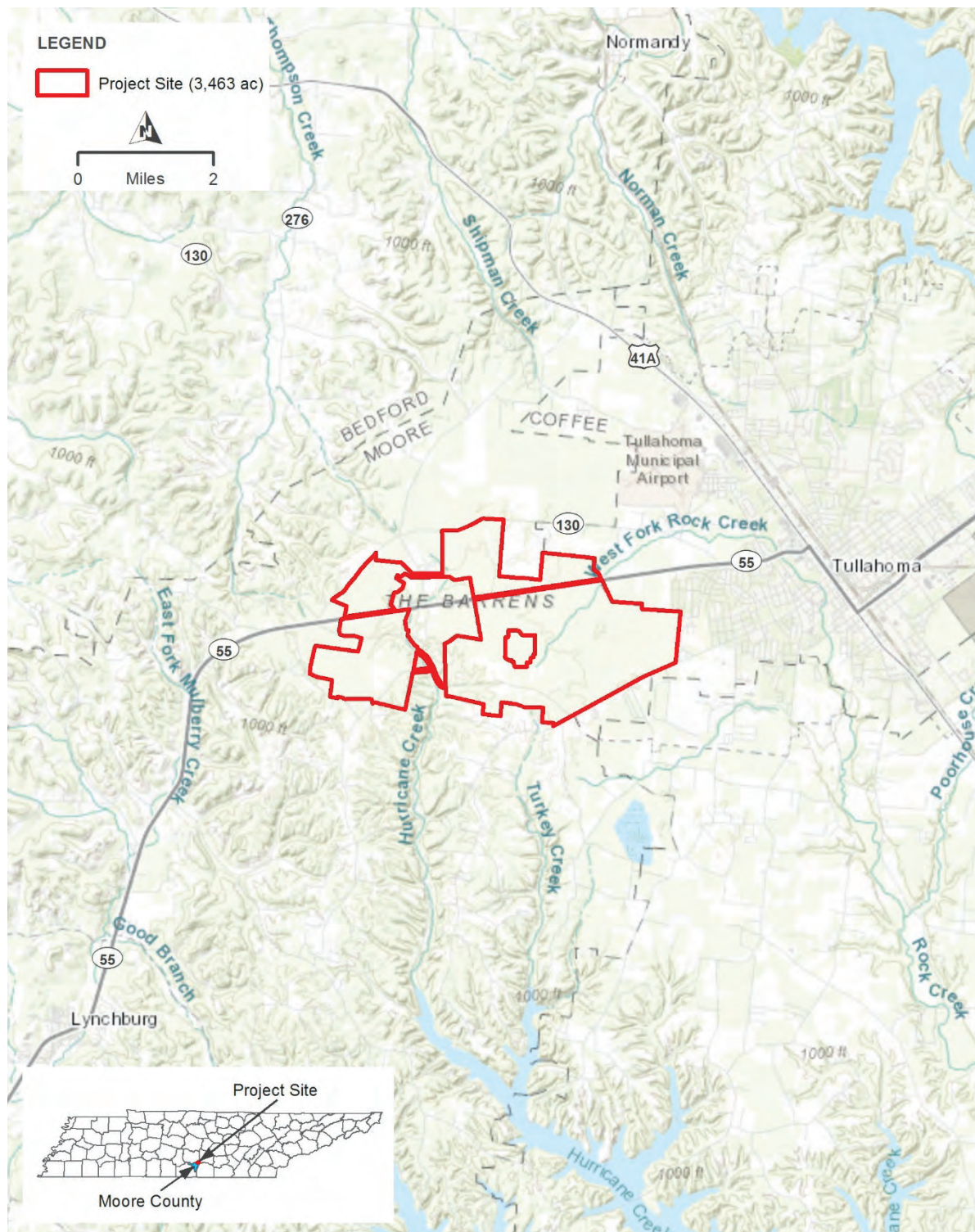


Figure 1-1. Moore County Solar Project Site

1.2 Decision to be Made

The decision before TVA is whether to purchase the power from the proposed Moore County Solar site, which would result in the construction, operation, maintenance, and eventual decommissioning of the proposed solar PV facility, as well as the construction, operation, and maintenance of a substation and associated facilities to interconnect the solar PV facility to TVA's existing electrical transmission network.

1.3 Scoping and Public Involvement

On May 3, 2021, in accordance with the National Environmental Policy Act (NEPA), TVA published a Notice of Intent (NOI) in the *Federal Register* announcing plans to prepare either an EIS or an environmental assessment (EA) to assess the potential environmental effects associated with constructing, operating, maintaining, and decommissioning the solar PV facility (Appendix B). The NOI initiated a 30-day public scoping period that concluded on June 4, 2021. The NOI solicited public input on the scope of the EIS and the environmental issues that should be considered in the EIS. The NOI also requested data, information, and analyses relevant to the Proposed Action. TVA sent notification of the NOI to local and state government entities and federal agencies, issued a Project news release in *Moore County News*, and posted the news release on the TVA website. TVA also sent the scoping notice via email to agencies and organizations.

During the scoping period, TVA received comments from the U.S. Geological Survey (USGS); U.S. Environmental Protection Agency (USEPA); Tennessee Natural Heritage Program, part of the Tennessee Department of Environment and Conservation (TDEC); Southeastern Grasslands Initiative; and two private individuals. Comments were related to purpose and need, agency coordination, alternatives, mitigation measures, land use, water resources, biological resources, air quality and greenhouse gas (GHG) emissions, socioeconomics, and environmental justice. Based on the comments received, as well as the results of field surveys and other considerations, TVA decided that the appropriate level of review for the Project is an EIS. The scoping report, along with comment summaries, full submissions, and TVA's responses, are included in Appendix B, and key information received is summarized in Chapter 4.

The scope of this EIS addresses the construction, operation, maintenance, and decommissioning of Moore County Solar and the associated modifications to the TVA electrical transmission network. This EIS (1) describes the existing environment in the project area (i.e., the potentially affected area within and beyond the Project Site and/or the TL upgrade locations and varies by each resource area), (2) analyzes potential environmental effects associated with the No Action and Proposed Action Alternatives, and (3) identifies and characterizes potential cumulative effects that could result from the Project in relation to other ongoing or reasonably foreseeable proposed activities within and surrounding the Project Site.

Based on internal and public scoping, identification of applicable laws, regulations, executive orders (EOs), and policies, TVA identified the resource areas listed below as requiring review within the EIS:

- Land Use
- Geology, Soils, and Prime Farmland
- Groundwater
- Visual Resources
- Noise
- Air Quality and GHG Emissions
- Cultural Resources

- Surface Water and Wetlands
- Floodplains
- Vegetation
- Wildlife, including Migratory Birds
- Aquatic Life
- Threatened and Endangered Species
- Natural Areas, Parks, and Recreation
- Utilities
- Waste Management
- Public Health and Safety
- Transportation
- Socioeconomics
- Environmental Justice

1.4 Regulatory Compliance, Permits, and Agency Coordination

This EIS is being prepared by TVA in accordance with NEPA (42 U.S. Code [U.S.C.] §§ 4321 et seq.), the regulations implementing NEPA promulgated by the Council on Environmental Quality (CEQ; 40 Code of Federal Regulations [CFR] §§ 1500–1508, 1515–1518, as updated July 16, 2020), and TVA NEPA regulations and procedures, (18 CFR §§ 1318). Other federal laws, as well as some EOs and state laws are also relevant to the Proposed Action (Table 1-1). These laws and orders may affect the environmental consequences of the solar PV facility or represent measures to implement during Project construction, operation, maintenance, and/or decommissioning. Each resource area discussion in Chapter 3 briefly describes the regulatory setting for the particular resource.

Table 1-1. Laws and EOs Relevant to the Proposed Action

Environmental Resource Area	Law / Executive Order
Geology, Soils, and Prime Farmland	Farmland Protection Policy Act (FPPA)
Water Resources	Clean Water Act (CWA) EO 11988 – Floodplain Management EO 11990 – Protection of Wetlands EO 14008 – Tackling the Climate Crisis at Home and Abroad Safe Drinking Water Act
Biological Resources	Rare Plant Protection and Conservation Regulations, Tennessee Administrative Code (TAC) Chapter 0400-06-02 Rules of the Tennessee Wildlife Resources Agency (TWRA), TAC Chapter 1660-01-32 Bald and Golden Eagle Protection Act Endangered Species Act (ESA) EO 13112 – Invasive Species EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds Migratory Bird Treaty Act EO 14008 – Tackling the Climate Crisis at Home and Abroad
Air Quality and GHG Emissions	Clean Air Act EO 14008 – Tackling the Climate Crisis at Home and Abroad
Cultural Resources	National Historic Preservation Act (NHPA) Native American Graves Protection and Repatriation Act

Environmental Resource Area	Law / Executive Order
Waste Management	Comprehensive Environmental Response, Compensation, and Liability Act Emergency Planning and Community Right-to-Know Act RCRA Solid Waste Disposal Act
Public Health and Safety	Rules and Regulations for Accommodating Utilities within Highway Rights-of-Way, T.A.C. Chapter 1680-6-1 Occupational Safety and Health Act Safe, Efficient Use, and Preservation of the Navigable Airspace (14 CFR § 77)
Environmental Justice	EO 12898 – Federal Actions to Address Environmental Justice in Minority and Low-Income Populations EO 14008 – Tackling the Climate Crisis at Home and Abroad

The Proposed Action would also require coverage under a variety of federal and state permits, as well as certification for the proper installation of some project components, as presented in Table 1-2.

Table 1-2. Permits Relevant to the Proposed Action

Description/ Submittal	Agency	Authorization	Applicability	Timing	Notes/ Assumptions
404 Nationwide Permit Application	U.S. Army Corps of Engineers (USACE) Nashville District	CWA Section 404	Impacts to Wetlands & Waters (<0.5-acre wetland and/or <300 linear feet of stream)	45 days; typically, contingent on 401 Water Quality Certification	Pre-Construction Notification may be required; Mitigation may be required
404 Individual Permit Application	USACE Nashville District	CWA Section 404	Impacts to Wetlands & Waters (≥0.5-acre wetland and/or ≥300 linear feet of stream)	6 to 12 months	Mitigation required
401 Water Quality Certification Aquatic Resource Alteration Permit (ARAP) Application	TDEC Division of Water Resources (DWR) – Columbia Office	CWA Section 401; Tennessee Water Quality Control Act (Tennessee Code Annotated [TCA] § 69-3-108, 0400-40-07); TCA § 0400-40-03	Impacts to Tennessee State Waters	45 days	Mitigation may be required for impacts; requires pre-filing notice 30 days prior to submission
402 National Pollutant Discharge Elimination System (NPDES) Permit Application	TDEC DWR – NPDES Stormwater Permitting Program	CWA Section 402 General Permit for Stormwater Discharges Associated with Construction Activities	Stormwater discharges from activities ≥1 acre of disturbance during construction	Notice of intent and stormwater pollution prevention plan to be filed 30 days prior to construction	Early coordination recommended; NOI and Stormwater Pollution Prevention Plan (SWPPP) for Construction Activity – Stormwater Discharges (Form CN-0940; If granted, Permit TNR100000 would authorize discharges associated with construction activities that result in a total land disturbance of one acre or greater, as governed by Section 402 of the CWA
Septic Permit Application	TDEC Environmental Field Office (EFO)	TCA §§ 68-221-401.414; TDEC Rule 0400-48-01	Installation of septic system or pump-out septic holding tank on Project Site	The review process generally takes 10 days and must be completed within 45 days of the date the application was submitted	Submit Application for Ground Water Protection Services (Form CN-0971) (TDEC 2019)

Description/ Submittal	Agency	Authorization	Applicability	Timing	Notes/ Assumptions
Well Installation Notification	TDEC Environmental Field Office (EFO)	Tennessee Water Well Act of 1963; TDEC Rule 0400-45-9	Installation of well on Project Site	The review process generally takes 10 days and must be completed within 45 days of the date the application was submitted	NOI (CN-1240) would be filed with TDEC
Obstruction Evaluation/Airport Airspace Analysis	Federal Aviation Administration (FAA)	14 CFR § 77	Structures exceed an instrument approach area of an airport	Notice of proposed construction to be submitted at least 45 days prior to construction	Form 7460-1 would be filed with FAA
Encroachment and Crossing Permit Applications	Tennessee Department of Transportation (TDOT)	T.A.C. Chapter 1680-6-1	Aboveground or below ground installation within state, federal-aid metro-urban, or state-aid highway system road ROWs	30-day review	N/A
	U.S. Department of Transportation (USDOT)	USDOT Highway/Utility Guide (USDOT 1993)	Aboveground or below-ground installation within U.S. highway ROWs	30-day review	N/A
Burn Permit Application	Tennessee Division of Forestry	TCA § 39-14-306	N/A	N/A	Only trees and brush from the Project Site would be burned; Weather conditions would be monitored and considered to ensure safety and minimize degradation to air quality during the open burning of any vegetation cleared from the site
Threatened and Endangered Species Consultation	USFWS	ESA Section 7	Federally listed species / migratory birds	45-day review (informal); 135-day review (formal)	TVA is initiating USFWS consultation in April 2022, along with publication of the Draft EIS; Consultation is ongoing
	TDEC Natural Heritage Program (NHP)	None	State protected species	Varies	Informal consultation with TDEC recommended if project triggers an ARAP and state protected species may be impacted

Description/ Submittal	Agency	Authorization	Applicability	Timing	Notes/ Assumptions
State Historic Preservation Office (SHPO) Consultation	Tennessee Historical Commission (THC)	NHPA Section 106	Cultural resources	30-day review	TVA initiated THC consultation on April 29, 2021 (Appendix A); TVA is sending second correspondence, with the draft Phase I cultural resources survey report, in April 2022, along with publication of the Draft EIS; Consultation is ongoing
Tribal Consultation	Federally Recognized Tribes with interest in project area, consisting of Absentee Shawnee Tribe of Indians of Oklahoma; Alabama-Coushatta Tribe of Texas; Alabama-Quassarte Tribal Town; Cherokee Nation; The Chickasaw Nation; Coushatta Tribe of Louisiana; Eastern Band of Cherokee Indians; Eastern Shawnee Tribe of Oklahoma; Jena Band of Choctaw Indians; Kialegee Tribal Town; The Muscogee (Creek) Nation; Poarch Band of Creek Indians; The Seminole Nation of Oklahoma; Shawnee Tribe; Thlopthlocco Tribal Town; and United Keetoowah Band of Cherokee Indians in Oklahoma	NHPA Section 106	Cultural resources	30-day review	TVA initiated tribal consultation on April 30, 2021 (Appendix A); TVA is sending second correspondence, with the draft Phase I cultural resources survey report, in April 2022, along with publication of the Draft EIS; Consultation is ongoing

1.5 Environmental Impact Statement Overview

Per 40 CFR 1502.1, the primary purpose of an EIS is to ensure federal agencies consider the environmental impacts of their actions in decision making. An EIS shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment.

This EIS tiers from the TVA IRP EIS (TVA 2019a), which explains TVA's need for additional generating capacity and TVA's decision to meet much of this need with solar generation. The IRP EIS also compares the environmental impacts of solar generation with other types of generation and describes system-wide, non-site-specific impacts of solar generation.

TVA has prepared this EIS to assess the environmental impacts of the Proposed Action. TVA has used the input from the public scoping period, summarized above in Section 1.3 and below in Chapter 4 and as provided in Appendix B, in developing this Draft EIS. TVA sent the Draft EIS to the U.S. Environmental Protection Agency (USEPA), which will publish a notice of its availability in the *Federal Register*, and also notified the public of its availability via advertisements published in *Moore County News* and *Tulahoma News* (Appendix B). Additionally, the Draft EIS is being distributed to interested individuals, groups, and federal, state and local agencies for their review and comment. Following the 45-day public comment period for the Draft EIS, TVA will respond to the comments received and incorporate any necessary changes into the Final EIS.

TVA anticipates publishing the Final EIS by late 2022. The completed Final EIS will be posted on TVA's environmental review website (TVA 2022a), and notices of its availability will be sent to those who received the Draft EIS or submitted comments on the Draft EIS. TVA also will send the Final EIS to USEPA, which will publish a notice of its availability in the *Federal Register*. TVA will then issue a Record of Decision no sooner than 30 days after the notice of availability of the Final EIS; the Record of Decision will (1) state the decision; (2) identify the alternatives considered and the environmentally preferable alternative(s); and (3) state whether TVA has adopted all practicable means to avoid or minimize environmental harm from the alternative selected and, if not, why not, and summarize, where applicable, a monitoring and enforcement program for any enforceable associated mitigation requirements or commitments.

CHAPTER 2 - ALTERNATIVES

This chapter explains the rationale for identifying the alternatives to be evaluated, describes each alternative, provides a comparison of alternatives with respect to their potential environmental impacts, and identifies the Preferred Alternative.

Through scoping, TVA has determined that, from the standpoint of NEPA, there are two feasible alternatives available: the No Action Alternative and the Proposed Action Alternative.

2.1 No Action Alternative

The No Action Alternative provides a baseline of conditions against which the impacts of the Proposed Action Alternative are measured. Under the No Action Alternative, TVA would not implement the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location. Existing conditions (e.g., land use, natural resources, visual resources, physical resources, and socioeconomics) in the Project area would not change as a result of the Proposed Action; however, the Project site could be affected if the current land use practices continue. TVA would continue to rely on other sources of generation as described in the 2019 IRP (TVA 2019a) to ensure an adequate energy supply and to meet its goals for increased renewable energy and low GHG-emitting generation.

2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA to purchase the power generated by a proposed solar PV facility called Moore County Solar, located on an approximately 3,463-acre Project Site. SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar within a 1,430-acre footprint that avoids cultural, biological, and physical resources to the maximum extent possible. The Project would connect to TVA's existing adjacent Franklin–Wartrace No. 2 161-kV transmission line (TL) that extends north-south through the Project Site. To interconnect to TVA's existing electrical grid, SR Tullahoma and TVA would build an on-site 161-kV substation and switchyard, respectively, and TVA would replace the existing overhead ground wire with new fiber-optic overhead ground wire along an approximately 9.8-mile portion of the TL extending eastward from the Project Site. Together, the solar PV facility and the associated interconnection and TL upgrades are referred to herein as the Project or Proposed Action.

2.2.1 Project Description

Moore County Solar and associated transmission interconnection components would occupy approximately 1,430 acres of the 3,463-acre Project Site (Figure 2-1). The Project Site is located along Lynchburg Highway approximately two miles west of the city of Tullahoma, within the metropolitan limits of Lynchburg in Moore County, Tennessee (Figure 1-1). The Project Site is mostly forested land, much of which has been recently harvested, along with some wetland areas, croplands, and early successional fields. Several residential subdivisions and a community college campus are adjacent to the Project Site. TVA's Franklin–Wartrace No. 2 161-kV TL extends north-south through the Project Site (Figure 2-2). The Project Site is bisected by State Route (SR) 55 (Lynchburg Highway), and its eastern boundary is adjacent to the western city limits of Tullahoma, Tennessee. The perimeter of the 1,430-acre developed solar PV facility, including the Project substation, switchyard, and operations and maintenance building, would be

enclosed by security fencing. The remaining 2,033 acres (58.7 percent) of the Project Site would be undeveloped apart from environmental enhancement measures intended to protect and restore on-site globally rare plant communities and rare plant and aquatic species populations.

The solar facility would connect to TVA's existing Franklin–Wartrace No. 2 161-kV TL via a proposed substation, switchyard, and five new pole structures on the Project Site. A 9.8-mile portion of the Franklin–Wartrace No. 2 161-kV TL would be modified through the replacement of the existing OHGW with new OPGW.

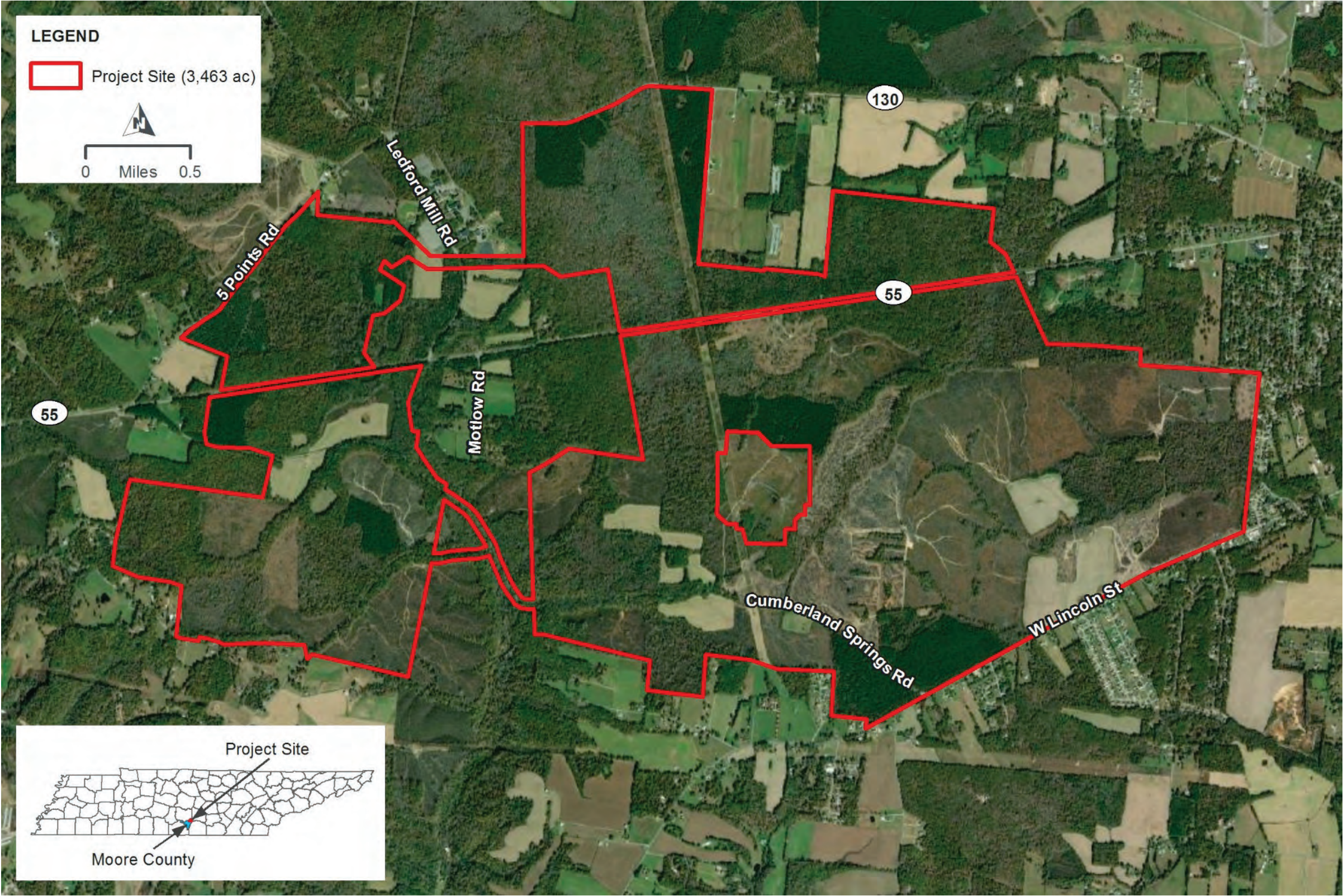


Figure 2-1. Aerial Photo Showing the 3,463-Acre Project Site

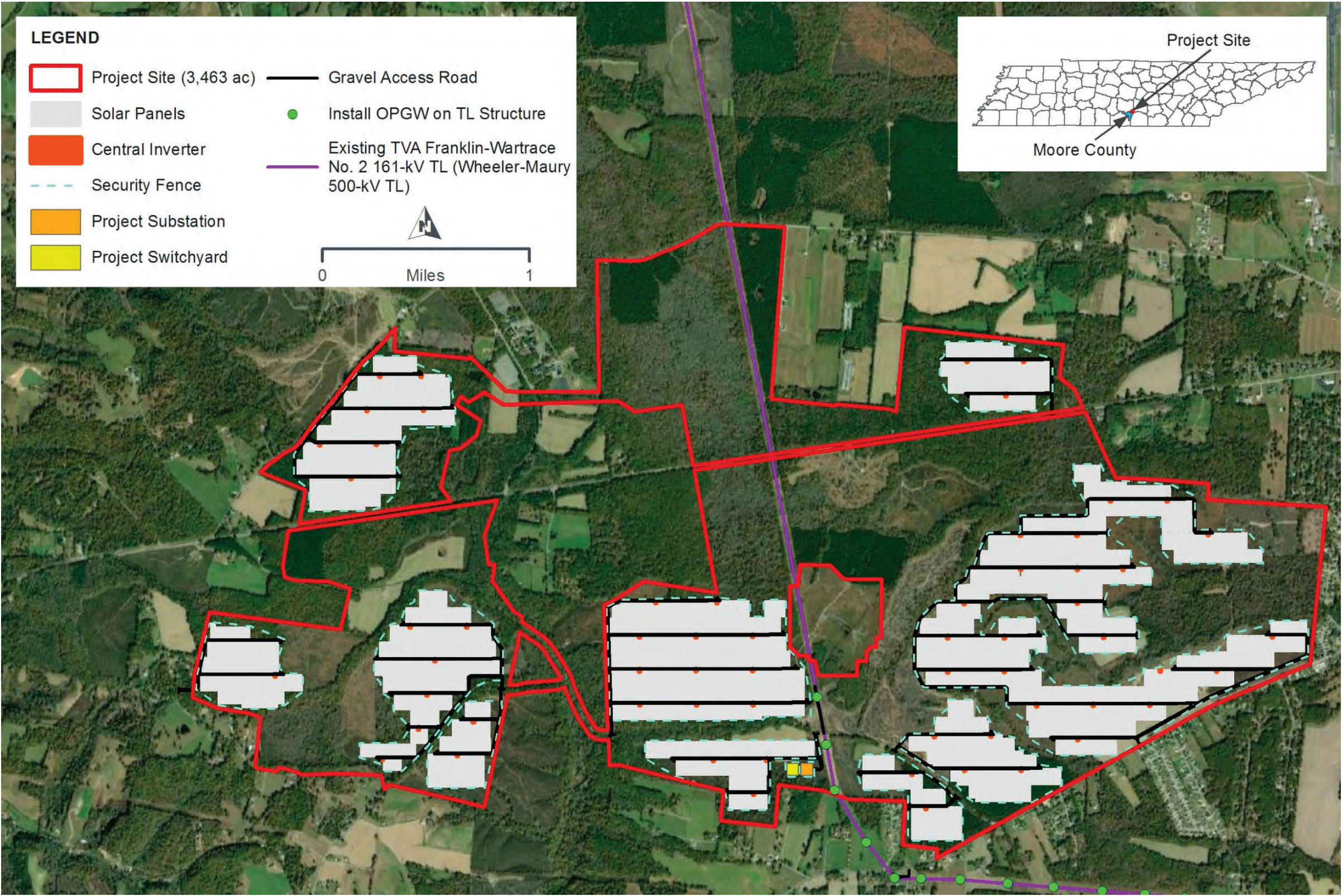


Figure 2-2. Aerial Photo Showing the Preliminary Layout of Moore County Solar Components

The Project would convert sunlight into direct current (DC) electrical energy within PV panels (i.e., modules) (Figure 2-3). PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current is produced, which can be used as electricity (TVA 2014).

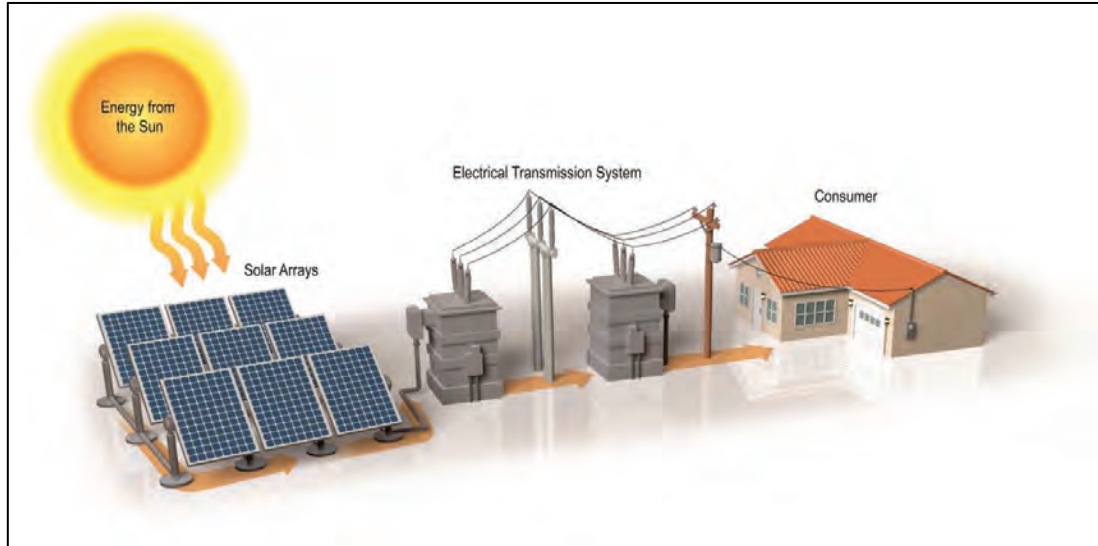


Figure 2-3. General Energy Flow Diagram of PV Solar System (not to scale)

The Project would be composed of PV modules mounted together in arrays. Groups of modules would be connected electrically in series to form “strings” of modules, with the maximum string size chosen to ensure that the maximum inverter input voltage is not exceeded by the string voltage at the Project Site’s high design temperature. The approximately 609,000 modules, each about 6.6 feet by 4 feet in size, would be located in individual blocks consisting of the PV arrays and an inverter station on a concrete pad or steel piles, to convert the DC electricity generated by the solar panels into AC electricity. The solar facility would be enclosed by chain-link security fencing. Apart from actions in environmental enhancement areas to protect and restore on-site globally rare plant communities and rare plant and aquatic species populations, the portions of the Project Site outside the fenced-in area would not be developed.

The modules would be attached to single-axis trackers that follow the path of the sun from the east to the west across the sky (Figure 2-4). The inverter specification would fully comply with the applicable requirements of the National Electrical Code and Institute of Electrical and Electronics Engineers standards. Each inverter would be collocated with a

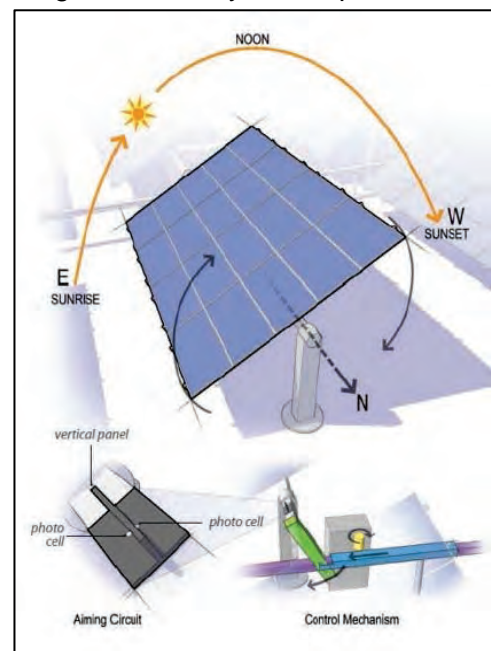


Figure 2-4. Diagram of Single-Axis Tracking System (not to scale)

medium voltage transformer (MVT), which would step-up the AC voltage to minimize the AC cabling electrical losses between the central inverters and the proposed on-site Project substation. Underground AC power cables would connect all of the MVTs to the main power transformer(s) (MPT) located within the substation. Compacted gravel or dirt access roads would provide access to each inverter block and the proposed substation and switchyard.

Figure 2-2 shows the Project site with the locations of major Project components. Other temporary or permanent Project components include construction laydown areas, security and communications equipment, and an operations and maintenance building. Also, if determined necessary, the Project would include Project water wells and a septic system or pump-out septic holding tank.

2.2.2 Solar Facility Construction

As part of NPDES permit authorization (Section 2.5), the site-specific SWPPP would be finalized with the final grading and civil design and would address all construction-related activities prior to construction commencement. The solar facility site would be prepared by surveying, staking, and installing six-foot-tall chain-link security fencing topped with three strands of barbed wire around the Project Site. Entrances to the solar facility would be protected by locked, double-swing gates. The Project Site would be accessible only to TVA, SR Tullahoma, and their agents and contractors.

A 60-foot vegetative buffer would be maintained around the perimeter of the Project Site per *A Resolution to Amend the Text of the Metropolitan Lynchburg and Moore County Zoning Ordinance Establishing Regulations for Solar Energy Systems as Permitted Use in the A-1-Agriculture-Forestry District and Establishing Regulations Governing the Development of Solar Energy Systems*, as approved or amended by the Board of Zoning Appeals prior to the start of other construction activities (Appendix A). The vegetative buffer is required around the perimeter of the site between the Project site boundaries and Project fence, where existing natural buffers are not present along public rights-of-way and where receptors or known future receptors would view the facility. The security fence would be installed between the vegetative buffer and the solar arrays.

Construction assembly areas (laydown areas) would be established for worker assembly, safety briefings, vehicle parking, and material storage during construction. The laydown areas would likely be graveled and would be placed to avoid cultural, biological, and water resources to the greatest extent practicable. Temporary construction trailers for material storage and office space would be parked on site. In accordance with TVA requirements, minimum 50-foot buffers surrounding wetlands and intermittent and perennial streams would be established as avoidance measures prior to any clearing, grubbing, grading, or utility line installation activities conducted by the construction contractor. Apart from removal of tall vegetation through non-mechanical means and leaving the roots in place, these buffered areas would be avoided during construction to the greatest extent practicable. The buffered areas would be marked and protected by silt fences and sediment traps in strategic drainage areas, and other erosion prevention and sediment control BMPs would be implemented, as detailed in the site-specific SWPPP.

Construction activities would be sequenced to minimize the time that bare soil in disturbed areas is exposed. Construction areas would be cleared of debris and tall vegetation, mowed, and lightly graded, as needed, for construction and placement of the solar modules, gravel access roads, substation, switchyard, accompanying electrical

components, and other Project components. Several on-site buildings would be demolished, and some other buildings and structures would remain to support the sheep grazing operation established as part of the Project, described in Section 2.2.3. Clearing of trees and other tall vegetation would be accomplished with chain saws, skidders, bulldozers, tractors, and/or low-ground pressure feller-bunchers. A setback of 200 feet should be assumed for typical shading and tree-clearing. Because the area to be cleared is primarily forested land, vegetative debris would accumulate during site preparation. This debris would be disposed of by open burning. Only vegetation and untreated wood would be burned, and no burning of other construction debris is anticipated. Construction debris would be hauled to a nearby disposal site, as discussed in Section 3.12, in accordance with federal, state, and local laws and regulations. Prior to burning, SR Tullahoma would obtain any necessary permits, as presented in Section 1.4. Mowing would continue as needed to contain growth during construction.

SR Tullahoma would work with the existing landscape (e.g., slope, drainage, utilization of existing roads) where feasible and minimize or eliminate grading work to the greatest extent possible. Grading activities would be performed with earthmoving equipment and would result in a consistent slope. Prior to any major grading, efforts would be made to preserve native topsoil, which would be removed from the area to be graded and stockpiled on site, avoiding sensitive resources and in accordance with the SWPPP, for redistribution over the disturbed area after the grading is completed. Off-site sediment migration would be minimized by the placement of silt fences around each area of ground disturbance within the Project Site. Other appropriate controls, such as temporary cover, would be used as needed to minimize exposure of soil and to prevent eroded soil from leaving the work area. To manage stormwater during construction, on-site temporary sedimentation basins, sediment traps, or diversion berms would be constructed within the disturbed area of the Project Site. Any sedimentation basins and traps necessary during construction would be compliant with TDEC requirements and would be constructed either by impoundment of natural depressions or by excavating the existing soil.

The floor and embankments of the sedimentation basins would be allowed to naturally revegetate after construction or replanted as necessary to provide natural stabilization and minimize subsequent erosion. Other disturbed areas would be seeded after construction using a mixture of certified weed-free, low-growing perennial and annual non-invasive grass and herb seeds containing species that would tend to attract pollinators and would be used as sheep fodder during operations. If conditions require, soil may be further stabilized by mulch or sprayable fiber mat. Hydroseeding may be employed as an alternative measure for areas with steep slopes. Where required, hay mulch would be applied at three tons per acre and well distributed over the area. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas is stable.

During construction, water would be used as needed for soil compaction and dust control and for sewer treatment, if determined necessary. Water in sufficient quantity and quality would be made available through the use of on-site groundwater wells or by delivery via water trucks. If selected, wells would be located to provide access for construction water and to reduce the potential for any significant water level drawdown. If water quality is unsuitable for potable use without disinfection at a minimum, a potable water treatment system would be installed. If needed, SR Tullahoma would perform initial groundwater drilling and testing to gather information on aquifer characteristics and develop a plan for the production well design. Wells would be constructed using conventional well drilling techniques. A truck-mounted drilling rig would set up at the identified location(s). If

necessary, gravel would be used to temporarily stabilize the surface at these location(s). Water-based drilling muds would be collected and dewatered, with runoff occurring locally into nearby field areas. Dewatered muds would be non-toxic and may be spread as subsoil during site grading. If determined necessary, sewer treatment would be accomplished through use of a pump-out septic holding tank.

The design of the tracker support structures could vary depending on the final PV technology and vendor selected. The trackers would likely be attached to driven galvanized steel pile foundations, depending on results of the upcoming geotechnical survey. The piles are driven with a hydraulic ram to a depth typically less than 10 feet. Surface disturbance is typically limited to area in which the small tractor-sized hydraulic ram machinery operates, including the pile insertion location. Screw piles are another option for PV foundations; these are drilled into the ground with a truck-mounted auger. Screw piles create a similar soil disturbance footprint as driven piles.

The PV modules would be manufactured off-site and shipped to the Project Site ready for installation. The AC collection cables would be installed underground throughout the solar facility in trenches three- to four-feet deep and one- to four-feet wide. The trenches would be backfilled with the excavated soil and then compacted. AC collection cables would be installed by boring beneath jurisdictional streams and wetlands and paved roads and/or as overhead lines mounted on poles. These methods would avoid impacts to jurisdictional waters.

The MPT(s) would be supported on a concrete foundation. An underground or aboveground transmission cable would be constructed to connect the MPT through a circuit breaker. As the solar arrays are installed, the balance of the facility would continue to be constructed and installed, and the instrumentation would be installed.

Subject to weather, construction activities would take approximately 18 months to complete using a crew of up to 450 workers sourced locally to the greatest extent possible. Work would generally occur during daylight hours, Monday through Saturday. Night-time construction could be necessary to make up schedule deficiencies or to complete critical construction activities and would require temporary lighting. Any permanent night-time lighting installed during the construction phase, which would likely be necessary at the operations and maintenance building, would be use timer- and/or motion-activated, downward facing lighting to minimize impacts to surrounding areas.

2.2.2.1 Electrical Interconnection

To interconnect to TVA's existing electrical grid, SR Tullahoma and TVA would build an on-site 161-kV substation and switchyard, respectively, and TVA would replace the existing overhead ground wire with new fiber-optic overhead ground wire along an approximately 9.8-mile portion of the adjacent TL extending eastward from between Pole Structures 272 and 273 and the Franklin substation, east of the Project Site. TVA would also install five new pole structures adjacent to the Project substation, on the Project Site. The switchyard would provide the electrical connection between the Project substation and the existing TVA Franklin–Wartrace No. 2 161-kV TL. This TL is co-located with TVA's Wheeler–Maury 500-kV TL on tall, laced-steel structures. TVA would also install OPGW along a portion of this TL extending 9.8 miles from the Project site eastward into Franklin County (Figure 2-5). This would involve improvements to existing structure access roads. The OPGW would be installed via helicopter, and ground crews would use the access roads to run the OPGW.

The 9.8-mile portion of the TL and the access roads that require modifications are together referred to as the TL upgrade locations.

TVA utilizes standard practices for transmission and interconnection-related construction activities. These guidance and specification documents are considered when assessing the effects of the Proposed Action and include:

- *A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities – Revision 3* (TVA's BMP manual; TVA 2017a)
- *TVA Environmental Quality Protection Specifications for Transmission Line Construction* (TVA 2017b),
- *TVA Transmission Construction Guidelines Near Streams* (TVA 2017c),
- *TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (TVA 2017d),
- *TVA Substation Lighting Guidelines* (TVA 2017e), and
- *TVA Site Clearing and Grading Specifications* (TVA 2017f).

All of these documents are available on TVA's electrical transmission network projects web page (TVA 2022b).



Figure 2-5. The Proposed Project Substation, Switchyard, and Work Areas Along the Existing TVA Franklin–Wartrace No. 2 161-kV TL

2.2.2.1.1 TVA Switchyard Construction

The switchyard location, shown on Figure 2-2 and Figure 2-3, would be fenced and graveled. As described in TVA's *Substation Lighting Guidelines* (TVA 2017e), lights at the proposed switchyard would be timer- and/or motion-activated and downward-facing and either fully shielded or would have internal low-glare optics, such that no light is emitted from the fixtures at angles above the horizontal plane.

The switchyard location would be cleared of vegetation and topsoil, and the construction area would be graded in accordance with TVA's *Site Clearing and Grading Specifications* (TVA 2017f). To clear trees and other tall vegetation, equipment used could include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. As necessary, any woody debris and other vegetation would likely be piled and burned, chipped, or taken offsite. Prior to burning, TVA would obtain any necessary permits. In some instances, vegetation may be windrowed along the edge of the construction site to serve as sediment barriers. Further guidance for clearing and construction activities can be found on TVA's transmission network projects web page (TVA 2022b).

The switchyard location would be leveled through a cut-and-fill process to achieve final design grade. The areas of the site that are too high (sloped) would be "cut" down to a level elevation, and other areas that are too low require "fill" to raise the elevation. Any additional fill required would be obtained from an approved/permitted borrow area. Once the switchyard site has been graded, excess soil (i.e., "spoil") would be removed in preparation for construction of concrete foundations for switchyard components. Temporary spoil storage is proposed to be located on site. Silt fences and site drainage structures would be installed during construction in accordance with the Project-specific SWPPP.

Following clearing, grading, and construction, disturbed areas on the properties (excluding the area within the fencing) would be restored to approximate pre-construction conditions, to the extent practicable, utilizing appropriate seed mixtures as described in TVA's BMP manual (TVA 2017a). Erosion controls would remain in place for each phase until that portion of the project is stabilized in accordance with the Project-specific SWPPP.

2.2.2.1.2 TVA TL Upgrades

Reels of conductor and ground wire would be delivered to the construction assembly area established for the TL upgrade activities. Access to the structures would be via existing roads. A small rope would be pulled from structure to structure. The rope would be connected to the conductor and ground wire and used to pull these down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

New poles would be augured into the ground to a depth equal to 10 percent of the pole's length plus an additional two feet, typically about 10 to 12 feet deep. Installation of the new poles would require blasting where bedrock is within the depth necessary to imbed the poles. Normally, the holes would be backfilled with the excavated material, but in some cases, gravel or a concrete-and-gravel mixture would be used, depending on local soil conditions. Equipment used during the construction phase would include trucks, truck-mounted augers, drills, and excavators, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations, such as areas with soft ground, to reduce the potential for environmental impacts per TVA BMPs (TVA 2022b).

Network upgrades would require improvements to existing access roads to allow vehicular access to each structure and other points along the existing TLs. Typically, new permanent or temporary access roads used for TLs are located on the TL right-of-way (ROW) wherever possible and are designed and located to avoid severe slope conditions and to minimize impacts to environmental resources such as streams. TL access roads are typically about 12- to 16-feet wide and are surfaced with dirt, mulch, or gravel.

With the appropriate permits as described in Table 1-2, culverts and other drainage devices, fences, and gates would be installed as necessary for the TL upgrades. Culverts installed in any perennial or intermittent streams would be removed following construction. However, in ephemeral streams, the culverts would be either left or removed, depending on the wishes of the landowner or any permit conditions that might apply. Additional applicable environmental quality protection specifications are provided on TVA's transmission website (TVA 2022b).

After the solar facility is constructed and the TL upgrades are complete, electrical service would be tested, motors would be checked, and control logic would be verified. Once the individual systems have been tested, integrated testing of the Project would occur.

2.2.3 Solar Facility Operations

During operation of the solar facility, no major physical disturbance would occur. Moving parts of the solar facility would be restricted to the east-to-west facing tracking motion of the solar modules, which amounts to a movement of less than a one degree angle every few minutes. This movement maximizes the collection of solar energy by rotating with the sun and is barely perceptible. In the late afternoon, module rotation would start to move from west-to-east in a similar slow motion to minimize row-to-row shading. At sunset, the modules would track to a flat or angled stow position. With the exception of fence repair, vegetation control, and periodic array inspection, repairs, and maintenance, Moore County Solar would have relatively little human activity during operation. Permanent lighting would be required at the substation, switchyard, and operations and maintenance building. The lighting would be timer- and/or motion-activated downward-facing and either fully shielded or would have internal low-glare optics, such that no light is emitted from the fixtures at angles above the horizontal plane to minimize impacts to surrounding areas, as described in TVA's *Substation Lighting Guidelines* (TVA 2017e).

During operations, Moore County Solar would require small groups of workers to be on site occasionally to manage the facility and conduct regular inspections, maintenance, and repairs, as well as shepherds to manage the on-site sheep herd. Inspections would include identifying any physical damage of panels, wiring, central inverters, transformers, and interconnection equipment, and drawing transformer oil samples. Vegetation on developed portions of the Project Site would be maintained to control growth. Near the solar facility infrastructure, vegetation would be managed to prevent shading of the PV panels. As part of SRC's Regenerative Energy program (SRC 2021), grazing sheep would be used to help control the growth of tall vegetation and reduce mowing needs on most of the fenced solar facility. The sheep would graze the non-invasive grass and herbaceous vegetation and be rotated within three days between temporarily fenced paddocks within the permanent Project fencing. Sheep would not return to graze previous paddocks for approximately 40 to 60 days. Water needs would be provided from a Project well and/or municipal water taps. The Project would avoid grazing sheep in sensitive biological, cultural, and water resource areas. These practices would maintain appropriate vegetation height, while avoiding overgrazing, reducing risk of erosion, and helping maximize plant and animal diversity.

Creation of pollinator and ground-nesting bird habitat would be encouraged by allowing seed heads to reach maturity wherever possible. The sheep would disperse seeds, both on their coats and through their manure, and their movement around the site would establish new plant growth and greater diversity in species composition. This would eliminate much of the need for mowing and selective herbicide application to manage vegetation growth, although these techniques would still be used as necessary. The presence of manure would also act as a natural fertilizer and protect against erosion. SR Tullahoma would monitor the ecological health of the sheep paddocks utilizing an established method to assess productivity and preservation of ecosystem services known as an ecological health index (Xu et al. 2019). Shepherds would be hired directly or under contract and would be sourced locally, if possible. Select sheep would be bred and sold to regional farmers as registered seedstock for breeding or as market lambs.

Precipitation in the region is typically adequate to remove dust and other debris from the PV modules while maintaining energy production; therefore, manual panel washing is not anticipated unless a site-specific issue is identified. If necessary, module washing would occur no more than twice a year and would comply with proper BMPs to prevent any soil erosion and/or stream and wetland sedimentation. The washing would not be expected to produce a discharge waste stream. Water during operation and maintenance would be made available through the use of on-site groundwater wells, as described in Section 2.2.2., or by delivery via water trucks.

The proposed solar facility would be monitored remotely to identify any security or operational issues. If a problem is discovered during non-working hours, a local repair crew or law enforcement personnel would be contacted if an immediate response were warranted.

2.2.4 Decommissioning and Reclamation

SR Tullahoma would operate the Project and sell power to TVA under the terms of a 20-year PPA. At the end of the 20-year PPA, SR Tullahoma would assess whether to cease operations at the solar facility or to replace equipment, if needed, and attempt to enter into a new PPA with TVA or make some other arrangement to sell the power. If the solar facility has not surpassed its useful life, operations and maintenance beyond the 20-year period, additional operations under a new PPA with TVA would be evaluated.

When operations cease, the facility would be decommissioned and dismantled, and the Project site would be restored per Project decommissioning requirements. The decommissioning process would be coordinated with Moore County. Decommissioning actions would include the removal of aboveground and below-ground components to a depth of at least three feet. Decommissioning actions could take several months; therefore, access roads, security fencing, and electrical power would temporarily remain in place for use by the decommissioning and restoration workers until no longer needed. The majority of decommissioned equipment and materials would be recycled. Materials that cannot be recycled would be disposed of at an approved facility in accordance with federal, state, and local law and regulations. Other wastes, including batteries, would be disposed of off-site and/or recycled in accordance with manufacturer recommendations and appropriate regulations and industry BMPs. Dump trucks, flatbed and rear-loader garbage trucks, and other large vehicles would visit the Project Site each day during the decommissioning period to transport decommissioned equipment and materials off-site. Following component removal and if requested by the landowner, holes would be filled with local soils, and roads

and large excavated rocks would be removed. Overall, the Project site would be returned to a tillable state and revegetated.

2.3 Alternative Development

In determining the suitability for development of a site within TVA's service area that would meet the goals of expanding TVA's renewable energy portfolio, multiple factors were considered. This process involved screening potential locations and ultimately eliminating those sites that did not have the needed attributes. This process of review and refinement ultimately led to the consideration of the Project site.

The site screening process involves several iterations beginning with the general solar resource (the amount of insolation) and the availability of nearby appropriately sized electric infrastructure for interconnection with sufficient available transmission capacity for the proposed solar facility. This is followed by screening for suitable large-scale landscape features that would allow for utility-scale solar development including:

- Generally flat landscape with minimal slope, with preference given to disturbed contiguous land with no on-site infrastructure or existing tall infrastructure in the immediate vicinity;
- Land having sound geology for construction suitability, with minimal and/or avoidable floodplains or large forested or wetland areas;
- Large contiguous parcels of land with compatible local zoning and located away from densely populated areas; and
- Ability to avoid and/or minimize impacts to known sensitive biological, visual, and cultural resources.

As a result of this screening process, the current Project in Moore County was selected for potential solar development.

2.4 Comparison of Alternatives

This EIS evaluates the potential environmental effects that could result from implementing the No Action Alternative and the Proposed Action Alternative. The analysis of impacts in this EIS is based on the current and potential future conditions on the properties and the surrounding project area.

A comparison of the impacts of the alternatives is provided in Table 2-1.

Table 2-1. Comparison of Impacts by Alternative

Resource Area	No Action Alternative	Proposed Action Alternative
Land Use	Existing land uses would likely remain a mix of forested, herbaceous, woody wetlands, and agricultural for the foreseeable future.	Minor direct impacts on land use due to change from forest management with timbering operations and some agricultural uses to industrial uses. Regenerative agricultural practices planned in association with the Project (i.e., sheep operations) would allow for some agricultural uses to continue to occur on site and help offset the primary change of land use to industrial uses.
Geology, Soils, and Prime Farmland	Geology/Soils: Minor impacts if the current land use practices continued. Prime Farmland: Minor impacts if current land use practices continued.	Geology: Minor direct impacts to potential subsurface geological resources. Soils: Minor direct impacts resulting from minor to minimal increases in erosion and sedimentation during construction and operation. While in operation, adverse impacts to soils would be partially offset by beneficial effects to soil health with the use of non-invasive vegetation. Prime Farmland: Minor direct impacts from removal of 1,207 acres of prime farmland from most potential agricultural use for the duration of the Project. Adverse impacts to soil productivity may be offset by the beneficial effects to soil health of maintaining a permanent vegetative cover during facility operation.
Water Resources	Groundwater: Indirect impacts to groundwater resources could occur if current land use practices continued. Surface Water and Wetlands: Minor indirect impacts if current land use practices continued. Floodplains: Impacts associated with current land uses would continue.	Groundwater: No direct adverse impacts anticipated; minor beneficial indirect impacts to groundwater due to reduction in erosion and planting of perennial and annual, non-invasive vegetation. Surface Water and Wetlands: Minor beneficial indirect impacts to surface water due to reduction in erosion compared with current conditions. The Project is anticipated to result in minor permanent impacts to some streams, open waters and wetlands due to the fill of 490 linear feet (LF) of USACE-jurisdictional ephemeral streams for solar panel blocks, the fill of 7,366 LF of non-USACE-jurisdictional ditches for road crossings and solar panel blocks, the fill of 1.9 acres of non-USACE-jurisdictional open waters for road crossings and solar panel blocks, and the fill of 1.4 acres of non-USACE-jurisdictional/TDEC-jurisdictional wetlands for road crossings and solar panel blocks. There would be no direct impacts to USACE-jurisdictional perennial streams, intermittent streams, open waters, and wetlands. Floodplains: Minor direct and indirect impacts due to construction activities.

Resource Area	No Action Alternative	Proposed Action Alternative
Biological Resources	<p>Vegetation: Minor impacts to vegetation if current land use practices continue.</p> <p>Wildlife and Migratory Birds: Minor impacts to wildlife and migratory birds if current land use practices continue.</p> <p>Aquatic Life: Minor impacts to aquatic life if the current land use practices continue.</p> <p>Threatened and Endangered Species: Minor impacts to threatened and endangered species if current land use practices continue.</p>	<p>Vegetation: Moderate direct impacts to vegetation by clearing of up to approximately 780 acres of trees and other tall vegetation (37 percent of the tall vegetation on site). Less than 10 acres of this forest is mature with well-developed canopy and an understory populated with mostly native species.</p> <p>Wildlife: Minor direct and indirect adverse impacts to migratory birds and other wildlife due to elimination of habitat, particularly forest clearing. Direct effects to some individuals may occur if those individuals are immobile during the time of habitat removal if activities took place during breeding, nesting, and hibernation seasons.</p> <p>Aquatic Life: Minor impacts due to temporary increases in erosion and siltation. The Project would avoid the newly identified undescribed crayfish. As an enhancement measure, TVA and SR Tullahoma would develop and implement a conservation plan that would have the dual beneficial effect of protecting and restoring on-site globally rare aquatic species populations.</p> <p>Threatened and Endangered Species: With implementation of avoidance and minimization measures and use of BMPs, the Project is not likely to significantly affect federal or state-listed species. As an enhancement measure, TVA and SR Tullahoma would develop and implement a conservation plan that would have the dual beneficial effect of protecting and restoring on-site globally rare plant communities and rare plant populations.</p>
Natural Areas, Parks, and Recreation	No impacts.	Minor impacts due to elimination of dispersed outdoor recreational activities on site.
Visual Resources	Minor impacts to visual resources if current land use practices continue.	<p>Temporary, minor impacts on visual resources during the construction phase due to increased activity and altering the visual character.</p> <p>During operations, minimal to minor impacts in the immediate vicinity due to existing tree buffers and the installation and maintenance of a vegetative buffer around the perimeter of the site between the Project site boundaries and Project fence, where existing natural buffers are not present along public rights-of-way and where receptors or known future receptors would view the facility.</p>
Noise	Minor impacts to the ambient sound environment if current land use practices continue.	Minor, temporary adverse impacts would occur during construction. Minimal to negligible impacts during operations and maintenance.

Resource Area	No Action Alternative	Proposed Action Alternative
Air Quality and GHGs	Minor impacts to air quality if current land use practices continue.	<p>Air Quality: Minor direct impacts during construction of the Project. Long-term, minor beneficial impacts due to increasing the capacity of non-emitting generating facilities providing power to the TVA system.</p> <p>Regional Climate: No noticeable direct or indirect impacts.</p> <p>GHGs: Temporary, negligible impacts to GHG emissions during construction and maintenance, as well as reduced carbon storage from forest clearing. Offsetting beneficial effects would also occur, due to the nearly emissions-free power generated by the solar facility, offsetting power that would otherwise be generated by the combustion of fossil fuels.</p>
Cultural Resources	Minor impacts if current land use practices continue.	With avoidance of an on-site cemetery and due to forested screening of the Motlow House, the Project would not adversely affect historic properties and other sensitive cultural resources.
Utilities	Negligible to minor impacts if current land use practices continue.	Potential short-term, minor impacts to local utilities (electricity and telecommunication connections) when bringing the solar facility on-line or during routine maintenance of the facility. Long-term, minor beneficial impacts to electrical services across the region due to additional renewable energy resources.
Waste Management	Negligible to minor impacts if current land use practices continue.	No adverse impacts to waste management are anticipated with the use of BMPs.
Public Health and Safety	Minor impacts if current land use practices continue.	Minor, temporary impacts during construction that would be minimized with adherence to Occupational Safety and Health Administration (OSHA) regulations and health and safety plans.
Transportation	Minor impacts if current land use practices continue.	Minor direct impacts to transportation during construction. Project effects to normal traffic patterns would be minimized by implementation of specific measures designed to address the effects.
Socioeconomics	Minor beneficial effects if current land use practices continue.	<p>Short-term, minor beneficial economic impacts would result from construction, including the purchase of materials, equipment, and services and a temporary increase in employment, income, and population.</p> <p>Long-term, minor beneficial impacts to economics and population from Project operation. The local tax base may increase with operation of the solar facility and would be most beneficial to Moore County and the vicinity.</p>
Environmental Justice	Negligible to minor impacts if current land use practices continue.	No disproportionately high or adverse direct or indirect impacts on identified minority or low-income populations.

2.5 Identification of Mitigation Measures

The Project would implement minimization and mitigation measures in relation to resources potentially affected by the Project. These would be developed with consideration to BMPs, permit requirements, and adherence to the SWPPP. In association with the proposed electrical interconnection, TVA would employ standard practices and specific routine measures to avoid and minimize impacts to resources. These practices and measures are summarized in this section.

2.5.1 Standard Practices and Routine Measures

SR Tullahoma would implement the following minimization and mitigation measures in relation to potentially affected resources:

- Visual Resources
 - Use timer- and/or motion-activated downward-facing, fully shielded and/or low-glare lighting to limit visual effects at night;
- Soils
 - Install silt fence along the perimeter of vegetation-cleared areas,
 - Implement other soil stabilization and vegetation management measures to reduce the potential for soil erosion during site operations, and
 - Make an effort to balance cut-and-fill quantities to alleviate the transportation of soils offsite during construction;
- Water Resources
 - Comply with the terms of the SWPPP prepared as part of the NPDES permitting process,
 - Use BMPs for controlling soil erosion and runoff, such as the use of 50- to 60-foot buffer zones surrounding intermittent and perennial streams and wetlands and the installation of erosion control silt fences and sediment traps,
 - Implement other routine BMPs as necessary, such as non-mechanical tree removal within surface water buffers, placement of silt fence and sediment traps along buffer edges, selective herbicide treatment to restrict application near receiving water features, and proper vehicle maintenance to reduce the potential for adverse impacts to groundwater,
 - Impacts to water resources deemed jurisdictional to TDEC and USACE would be permitted in compliance with the Clean Water Act Sections 401 and 404, and
 - Implement mitigation measures as defined in TVA's 1981 *Class Review of Repetitive Actions in the 100-Year Floodplain*, as applicable to Project effects.
- Biological Resources
 - Revegetate with perennial and annual, non-invasive vegetation, including plants attractive to pollinators, to reintroduce habitat, reduce erosion, and limit the spread of invasive species (per EO 13112, Invasive Species),
 - Follow USFWS recommendations regarding biological resources,
 - Avoid siting generation equipment and associated infrastructure in areas that support state-listed plant species and rare plant habitats,
 - Use downward facing and timer- and/or motion-activated lighting to limit attracting wildlife, particularly migratory birds and bats,
 - Instruct personnel on wildlife resource protection measures, including (1) applicable federal and state laws such as those that prohibit animal disturbance, collection, or removal, (2) the importance of protecting wildlife

- resources, and (3) avoiding plant disturbance in undisturbed and buffer areas,
- Use only USEPA-registered herbicides in accordance with label directions designed, in part, to restrict applications near receiving waters and to prevent unacceptable aquatic impacts; and
- Coordinate with U.S. Department of Agriculture (USDA) if active osprey and eagle nests are identified during aerial nest surveys of the TL upgrade locations to develop avoidance and minimization measures and ensure compliance under federal law prior to commencement of the TL upgrade activities.
- Solid and Hazardous Waste Management
 - Develop and implement a variety of plans and programs to ensure safe handling, storage, and use of hazardous materials;
- Public Health and Safety
 - Implement BMPs for site safety management to minimize potential risks to workers;
- Transportation
 - Post a flag person during heavy commute periods, prioritize access for local residents, and implement staggered work shifts during daylight hours to manage construction traffic flow near the Project Site, and
 - Flight paths would be determined prior to the installation of OPGW by helicopter and filed with the appropriate authorities as required;
- Noise
 - Limit construction activities primarily to daytime hours and ensure that heavy equipment, machinery, and vehicles utilized at the Project Site meet all federal, state, and local noise requirements; and
- Air Quality and GHG Emissions
 - Comply with local ordinances or burn permits if burning of vegetative debris is required and use BMPs such as periodic watering, covering open-body trucks, and establishing a speed limit to mitigate fugitive dust.

2.5.2 Non-Routine Mitigation Measures

- Land Use and Soils
 - Utilize SRC's regenerative energy program, including perennial and annual, non-invasive pollinator-attractive plantings, biological vegetation management (e.g., grazing sheep), and other measures that improve the land within the Project area;
- Biological Resources
 - Develop a conservation plan that complements SRC's regenerative energy program and has the beneficial effects of protecting and restoring globally rare plant and aquatic communities and populations that occur on site; and
- Visual Resources
 - Install vegetative buffer along the Project fence perimeter where the facility would otherwise be visible from public ROWs and residences in accordance with *A Resolution to Amend the Text of the Metropolitan Lynchburg and Moore County Zoning Ordinance Establishing Regulations for Solar Energy Systems as Permitted Use in the A-1-Agriculture-Forestry District and Establishing Regulations Governing the Development of Solar Energy Systems*, as approved or amended by the Board of Zoning Appeals prior to construction start.

2.6 The Preferred Alternative

TVA's preferred alternative for fulfilling its purpose and need is the Proposed Action Alternative. This alternative would generate renewable energy for TVA and its customers with only minor environmental impacts due to the implementation of BMPs and minimization and mitigation efforts, as described in Section 2.5. Implementation of the Project would help meet TVA's renewable energy goals and would help TVA meet customer-driven energy demands on the TVA system.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the existing environmental, social, and economic conditions of the project area, as defined for each resource area, and the potential environmental effects that could result from implementing the No Action or Proposed Action Alternative.

3.1.1 Identification of Other Actions

Depending on the geographic area of analysis for each resource area, past, present, and reasonably foreseeable future actions (RFFAs) that are considered in this cumulative analysis are listed in Table 3-1. These actions were identified within the overall 10-mile geographic area of analysis as having the potential to, in aggregate, result in larger and potentially adverse impacts to the resources of concern.

Table 3-1. Summary of Other Past, Present, or Reasonably Foreseeable Future Actions within a 10-Mile Radius of the Proposed Action

Action	Description	Project Type
SR 16 (US 41-A) Improvements	The SR 16 (US 41-A) project encompasses approximately 12 miles between SR 64 in Shelbyville and the Tullahoma city limits, approximately 2.5 miles north of the Project Site. Improvements include increasing the number of lanes; increasing lane, structure, and shoulder widths; and improving route deficiencies (TDOT 2021a).	Past/Present
Tullahoma Airport Business Park Expansion	A 102-acre business/industrial park on the northwestern portion of the Tullahoma Regional Airport, approximately 1.5 miles north of the Project Site. One industry, XP Services, exists on site. The remainder of the business park is available for future expansion (Tullahoma Area Economic Development Corporation 2021).	Past/Present/RFFA
SR 55 Turn Lane Project at Moore County High School	Proposed installation of turn lanes at both the entrance to Moore County High School, Goodbranch Road directly across from the Lynchburg Nursing Center, and the entrance to the baseball fields, approximately 4.5 miles southwest of the Project Site. Also, the bridge nearest the Moore County Water Treatment Plant would be widened to three lanes (The Lynchburg Times 2020).	RFFA
SR 55 Widening	Proposed widening of SR 55 from two lanes to four lanes from First Avenue to SR 16, approximately two miles east of the Project Site. Also includes the replacement of the existing bridge over North Fork Rock Creek and the Rock Creek Greenway. The existing bridge is a four-span, 156-foot-long structure and the proposed bridge would be a 2-span, 170-foot-long structure (TDOT 2022).	RFFA

Action	Description	Project Type
Cedar Lane Sidewalks Project	Proposed installation of sidewalks along William Northern Boulevard and Cedar Lane, tying them into Tullahoma's existing greenway, approximately two miles north of the Project Site (The Tullahoma News 2021).	RFFA
Ledford Mill Road Project	Proposed widening of the Ledford Mill Road from SR 16 to Taxiway Lane, approximately 1.5 miles north of the Project Site. Also, the box culvert over the North Fork of Rock Creek would be widened (The Tullahoma News 2021).	RFFA
Coffee County Joint Industrial Park	A proposed 49-acre industrial site approximately nine miles northeast of the Project Site (Tennessee Department of Economic and Community Development 2021).	RFFA

3.2 Land Use

3.2.1 Affected Environment

Land use is defined as the way people use and develop land, including leaving land undeveloped or using land for agricultural, residential, commercial, and industrial purposes. The area surrounding the Project Site consists of agricultural, forested, institutional, and rural residential land that is not subject to zoning. Consistent with the surrounding area, imagery data collected from the National Land Cover Database (NLCD) show the Project Site as primarily deciduous forest with scattered areas of herbaceous land and woody wetlands (MRLC 2016; Table 3-2; Figure 3-1).

The 3,463-acre Project Site generally consists of flat to gently sloping land that ranges in elevation from approximately 1,010 feet above mean sea level (AMSL) where Hurricane Creek crosses the southern boundary of the Project Site to 1,150 feet AMSL in the western portion of the Project Site. The Project Site is bisected by SR 55, and its eastern boundary borders the western city limits of Tullahoma. Several residential subdivisions are adjacent to the Project Site, and the Moore County campus of Motlow State Community College adjoins and is partially surrounded by the northwest portion of the Project Site. Agricultural, forested, and rural-residential land uses dominate the landscape north, south, and west of the Project Site, while residential land uses dominate the landscape east of the Project Site.

The Project Site is situated on the World War II-era Motlow Range, an auxiliary training area for Camp Forrest. Motlow Range contained a series of firing ranges for light artillery, mortars, and machine guns and was decommissioned in 1946. According to historical aerial imagery and topographic quadrangle maps obtained from a Phase I Environmental Site Assessment (Phase I ESA; HDR 2021), land use in the Project area has, with the exception of several residences and the community college, remained relatively unchanged since at least 1936. Throughout this time, land uses on the Project Site and in the Project area have been primarily forest management with timbering operations and rural-residential, and major elements such as SR 55, SR 130, Cumberland Springs Road, and some TLs have been present for some time.

Table 3-2. Land Cover Types within the Project Site

NLCD Land Cover Type	Approximate Area (acres)	% of Project Site
Deciduous Forest	2,149	62
Herbaceous	294	9
Woody Wetlands	268	8
Evergreen Forest	218	6
Mixed Forest	174	5
Cultivated Crops	119	3
Hay/Pasture	96	3
Developed, Open Space	85	3
Shrub/Scrub	31	<1
Emergent Herbaceous Wetlands	23	<1
Developed, Low Intensity	2	<1
Developed, Medium Intensity	2	<1
Open Water	1	<1
Developed, High Intensity	1	<1
Total	3,463	100

3.2.2 Environmental Consequences

3.2.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, existing land uses would likely remain a mix of forested, herbaceous, woody wetlands, and agricultural for the foreseeable future.

3.2.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would implement the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Land uses within the 1,430-acre area of the Project Site that would be converted to the solar PV facility and associated infrastructure would change from forest management with timbering operations and agricultural uses to industrial use (Developed, Medium Intensity) with construction and operation of the solar PV facility. Regenerative agricultural practices planned in association with the Project (i.e., sheep operations) would allow for some agricultural uses to continue to occur on site and help offset the primary change of land use to industrial uses. The Project-related TL upgrades along TVA's existing Franklin–Wartrace No. 2 161-kV TL would not change current land uses. Therefore, minor, direct impacts to land use during construction are anticipated.

The activities associated with the Project would not have indirect effects on land use, as further changes to the rural area would not be expected to be stimulated by the solar facility.

Upon decommissioning of the solar facility, the land could return to forest management with timbering operations and agricultural uses or be converted to a different land use.

3.2.2.2.1 Cumulative Impacts

The Proposed Action would change land uses from primarily forest management with timbering operations and agricultural uses to a mixed industrial and agricultural use. The RFFA Coffee County Joint Industrial Park, listed in Table 3-1 could change land uses where it is proposed; therefore, together with the Proposed Action, would contribute to minor cumulative impacts on land use.

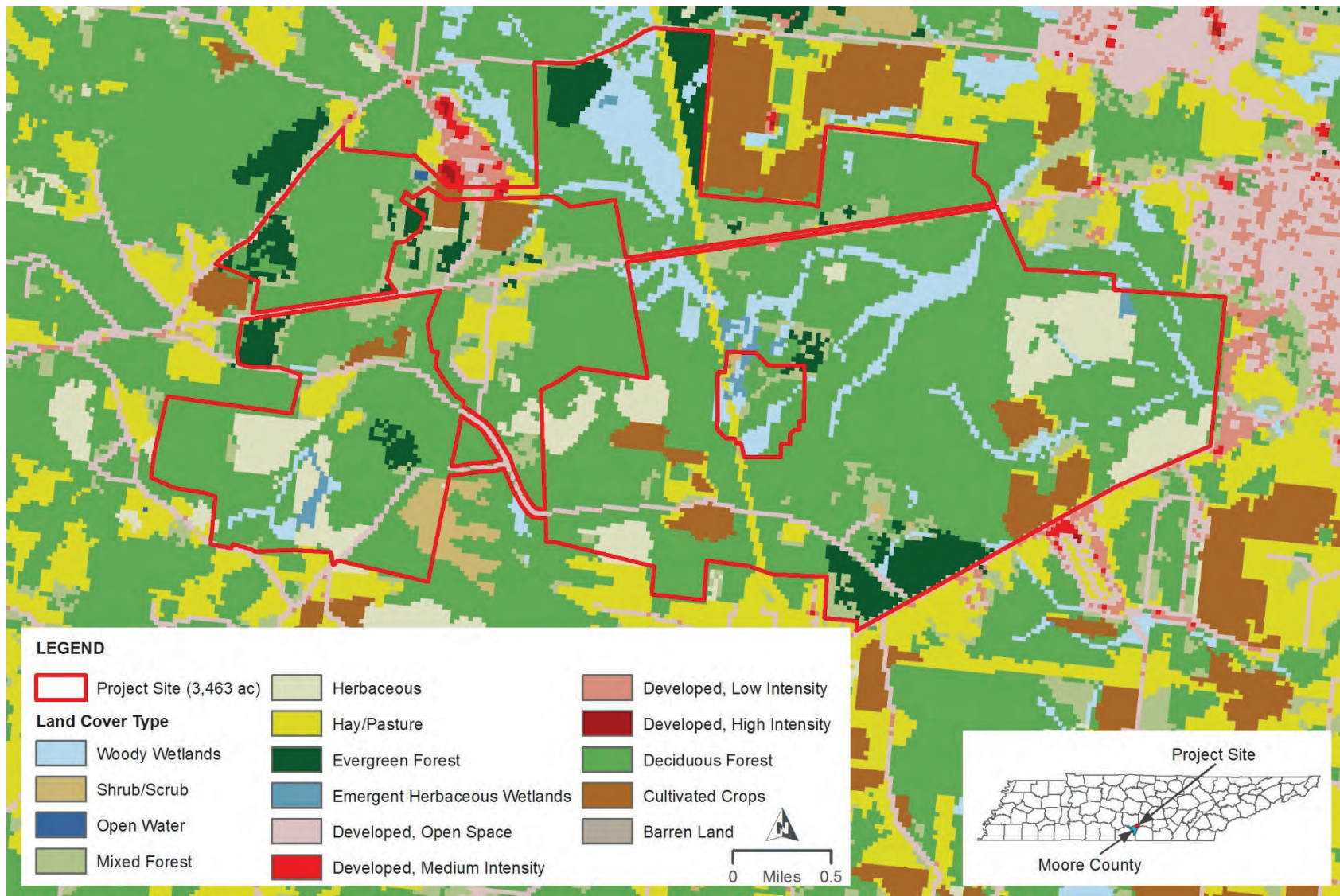


Figure 3-1. Land Cover in the Project Site Vicinity

3.3 Geology, Soils, and Prime Farmland

3.3.1 Affected Environment

The Project Site lies within the Interior Low Plateaus Province of Tennessee which consists of the Highland Rim section and the Nashville Basin. The Highland Rim section is a plateau characterized by rolling hills to flat areas in the northwest and southeast. Bedrock in the area is Mississippian limestones, chert, shale and sandstone. The Nashville Basin has an elevation of approximately 200 feet lower than the surrounding Highland Rim. Bedrock in the area is flat-lying limestone. Karst is well developed in parts of both the Highland Rim and the Nashville Basin (Greene and Wolfe 2000; Hardeman et al 1966).

3.3.1.1 Geology and Paleontology

The Project Site is primarily underlain by St. Louis Limestone, Warsaw Limestone, Fort Payne Formation and Chattanooga Shale. St. Louis Limestone is a fine-grained, brownish-gray limestone with a thickness of 100 to 280 feet. Warsaw Limestone is a coarse-grained, gray, cross-bedded limestone with a thickness 40 to 150 feet. Fort Payne Formation is characterized by bedded chert, calcareous and dolomitic silicestone, minor limestone, and shale with scattered lenses of crinoidal limestone. The average thickness is about 250 feet. Chattanooga Shale is characterized by carbonaceous shale with a thickness of 0 to 70 feet.

During the Precambrian period, the area that is now current-day Tennessee was located in the southern hemisphere and was covered by a shallow, tropical sea that was home to diverse species of sea life. By the Paleozoic period, Tennessee was located along the southern border of present-day North America and was still covered by sea water. During the Late Carboniferous period, mountain building in the east caused soil erosion and deposition resulting in swampy deltas to form in central Tennessee. Western Tennessee continued to be underwater while the central and eastern portion of Tennessee was above sea level continued through the Mesozoic and Cenozoic periods (The Paleontology Portal 2021).

3.3.1.2 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. The Project Site generally consists of flat to gently sloping land that ranges in elevation from approximately 1,010 feet AMSL where Hurricane creek crosses the southern boundary of the Project Site to 1,150 feet AMSL in the western portion of the Project Site. No significant slopes are present within several miles; therefore, landslides are not a potential risk. No volcanoes are present within several hundred miles of the Project Site.

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Land over sinkholes may stay intact until there is not enough support for the land above the spaces. Then a sudden collapse of the land surface can occur. These collapses can vary greatly in size and shape (Kaufmann 2007). No mapped sinkholes exist on the Project Site or within the Project area.

Seismic activity at the site could cause surface faulting, ground motion, ground deformation, and conditions including liquefaction and subsidence. The Modified Mercalli Scale is used within the United States to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower

degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of "g," the acceleration due to gravity. The U.S. Geological Survey (USGS) Earthquake Hazards Program publishes seismic hazard map data layers that display the PGA with 10 percent probability of exceedance in 50 years (one in 475-year event). The potential ground motion for the Project area is 0.1312 g, for a PGA with a two percent probability of exceedance within 50 years (Figure 3-2; USGS 2014). A 0.1312 g earthquake would have a strong perceived shaking with light potential for damage. Based on the USGS 2014 seismic hazard map, the Project Site has low risk for earthquakes that would cause structural damage.

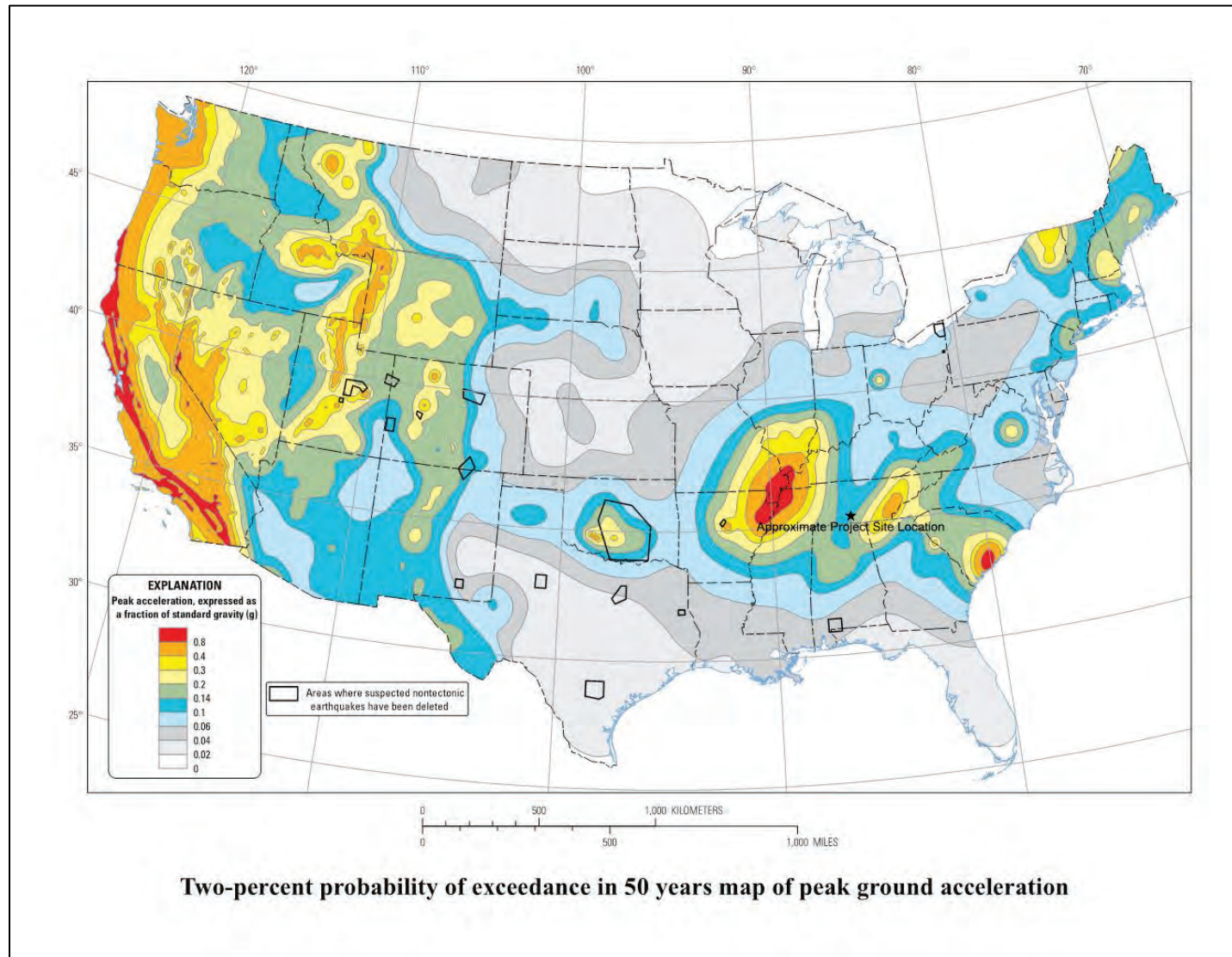


Figure 3-2. Closest Seismic Hazard Areas to the Project Site(USGS 2014)

3.3.1.3 Soils

Twenty soil types have been mapped on the Project Site and the majority are composed of Mountview silt loam, two to five percent slopes (33 percent); Dickson silt loam, zero to two percent slopes (18.9 percent); Taft silt loam, zero to two percent slopes (13.4 percent); Dickson silt loam, two to five percent slopes (12.4 percent); and Guthrie silt loam, zero to two percent slopes, frequently ponded (10.7 percent) (USDA 2019; Figure 3-3; Table 3-3). The other 15 soil types each make up less than five percent of the site.

The Mountview series soils consist of very deep, well drained and moderately well drained, soils that formed in silty mantle of presumably loess and underlying residuum of limestone or old alluvium. These soils are on undulating to rolling ridgetops and broad plateau-like areas with slopes ranging from zero to 20 percent. Primary uses are for growing hay, pasture, small grains, cotton, corn, and tobacco. The Dickson series soils consist of very deep, moderately well drained soils that formed in a silty mantle and the underlying residuum of limestone. These soils are on nearly level to sloping uplands. Slopes range from zero to 12 percent. Primary uses are for growing hay, pasture, small grains, corn, soybeans, and tobacco. The Taft series soils consist of very deep, somewhat poorly drained soils that formed in a silty mantle of loess or alluvium and the underlying residuum of limestone or shale. These soils are nearly level and are on upland flats, stream terraces, and in depressions. Primary uses are for growing pasture, hay, soybeans, and some corn. The Guthrie series soils consist of very deep, poorly drained soils that formed in silty material on upland flats and depressions. Slopes range from zero to two percent. Primary uses are for pasture and soybeans (USDA 2021).

3.3.1.4 Prime Farmland

Prime farmland is land that is the most suitable for economically producing sustained high yields of food, feed, fiber, forage, and oilseed crops. Prime farmlands have the best combination of soil type, growing season, and moisture supply and are available for agricultural use (i.e., not water or urban built-up land). The Farmland Protection Policy Act (FPPA; 7 U.S.C. § 4201 *et seq.*), requires federal agencies to consider the adverse effects of their actions on prime or unique farmlands. The purpose of the FPPA is “to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.”

Based on soils data obtained from the U.S. Department of Agriculture (USDA) Web Soil Survey, approximately 2,400 acres (69.3 percent) of the Project Site are designated as prime farmland, as illustrated in Figure 3-4. The soil types classified as prime farmland are indicated in Table 3-3.

Table 3-3. Soils on the Project Site

Soil Type	Farmland Classification	Area (acres)	% of Project Site
Agee silty clay loam, rarely flooded	Not prime farmland	1.2	<0.1
Dellrose gravelly silt loam, 12 to 20 percent slopes, eroded	Not prime farmland	11.2	0.3
Dickson silt loam, 0 to 2 percent slopes	All areas are prime farmland	655.7	18.9
Dickson silt loam, 2 to 5 percent slopes	All areas are prime farmland	429.5	12.4
Ennis gravelly silt loam, occasionally flooded	All areas are prime farmland	34.3	1.0
Guthrie silt loam, 0 to 2 percent slopes, frequently ponded	Not prime farmland	369.6	10.7
Hawthorne-Bodine complex, 20 to 60 percent slopes	Not prime farmland	39.2	1.1
Hawthorne-Sugargrove complex, 5 to 20 percent slopes	Not prime farmland	126.2	3.6
Humphreys gravelly silt loam, 5 to 12 percent slopes	Not prime farmland	8.6	0.2
Lawrence silt loam	All areas are prime farmland	3.0	0.1
Lee silt loam	Prime farmland if drained	1.5	<0.1
Lobelville silt loam, local alluvium phase	All areas are prime farmland	0.2	<0.1
Mountview silt loam, 0 to 2 percent slopes	All areas are prime farmland	132.0	3.8
Mountview silt loam, 2 to 5 percent slopes	All areas are prime farmland	1,141.5	33.0
Mountview silt loam, 5 to 12 percent slopes	Not prime farmland	43.7	1.3
Mountview silt loam, gently sloping phase	All areas are prime farmland	1.4	<0.1
Mountview silt loam, eroded, gently sloping phase	All areas are prime farmland	1.3	<0.1
Mountview silt loam, eroded, sloping phase	Not prime farmland	<0.1	<0.1
Mountview silt loam, sloping shallow phase	Not prime farmland	0.8	<0.1
Taft silt loam, 0 to 2 percent slopes	Not prime farmland	462.6	13.4
Total Prime Farmland		2,400.4	69.3

Source: USDA 2019

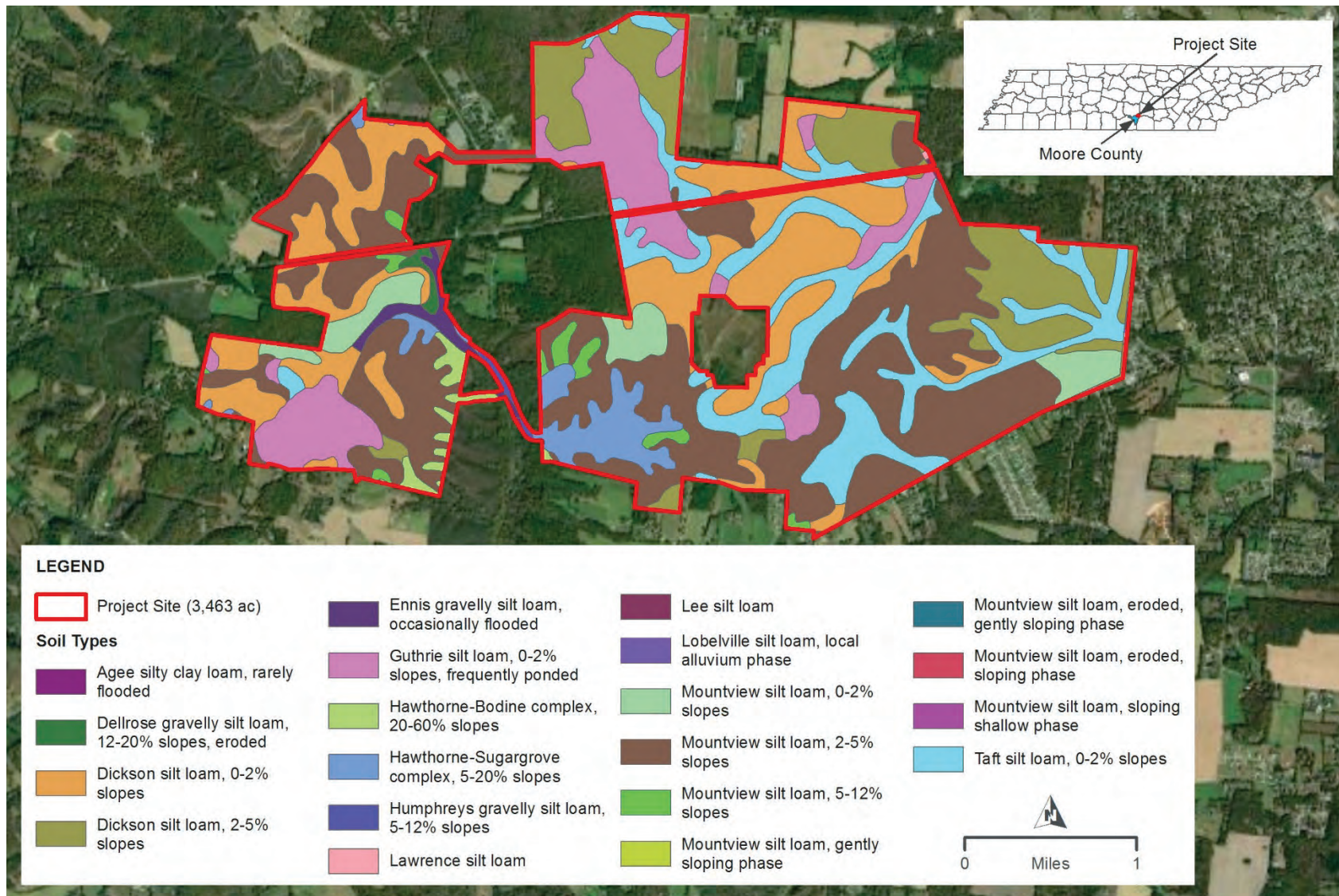


Figure 3-3. Soils on the Project Site

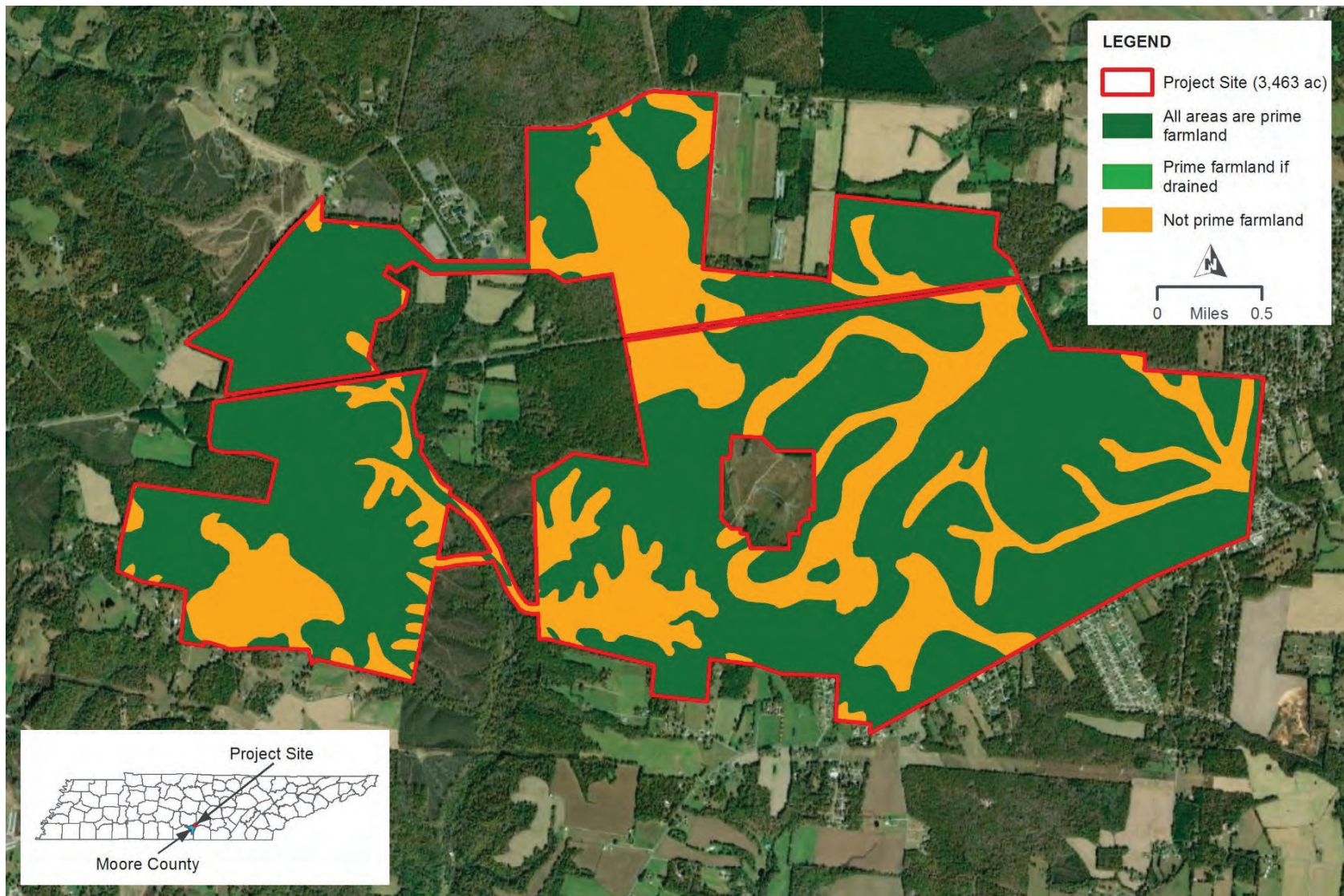


Figure 3-4. Soils Classified as Prime Farmland on the Project Site

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on geological, paleontological, soil resources, or prime farmlands would result if current land use practices continue.

3.3.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL. Direct impacts to geology, soil, and prime farmland resources would occur as a result of construction and operation of the Project.

Approximately 41.3 percent (1,430 acres) of the 3,463-acre Project Site would be cleared and/or graded for the solar facility, Project substation, switchyard, and associated on-site interconnection facilities. Grading and clearing for the solar facility would cause minor, localized increases in erosion and sedimentation, resulting in minor impacts to geology and soils. Array pilings and the five new TL pole structures would be driven into the ground to a depth of up to 20 feet and approximately 10 to 12 feet, respectively.

3.3.2.2.1 Geology and Paleontology

Under the Proposed Action, minor impacts to geology could occur. The solar arrays would be supported by steel piles, which would either be driven or screwed into the ground to a depth of up to 20 feet. The five new TL pole structures would be directly imbedded in holes where existing structures would be removed or newly augured into the ground to a depth equal to 10 percent of the pole's length plus an additional two feet, typically about 10 to 12 feet deep. Blasting of bedrock may be required to install pilings and pole structures.

Any on-site sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected with underground wiring placed in trenches three- to four-feet deep. Minor excavations would also be required for construction of the Project substation and to conduct other activities associated with the interconnection of the solar PV facility to TVA's existing electrical transmission network. Due to the small sizes of the subsurface disturbances, only minor direct impacts to potential subsurface geological resources are anticipated.

Should paleontological resources be exposed during site construction or operation activities, ground-disturbing work would be halted, and a paleontological expert would be consulted to determine the nature of the paleontological resources, recover these resources, analyze the potential for additional impacts, and develop and implement a recovery plan/mitigation strategy.

3.3.2.2.2 Geologic Hazards

Hazards resulting from geological conditions may be encountered in the case of sinkholes. While there are no known sinkholes on site, the Project Site is located over limestone bedrock that is susceptible to erosion and the creation of sinkholes. The Project Site has a low risk for earthquakes that will cause structural damage. The Project would be designed to comply with applicable standards to minimize issues pertaining with sinkholes and seismic activity. Geological hazard impacts on the site would be unlikely to impact off-site resources.

3.3.2.2.3 Soils

The facility construction would affect soils on 1,430 acres of the Project Site. None of the soils on the Project Site have characteristics that would require special construction techniques or other non-routine measures. TL upgrades may require improvements to existing access roads and may also require five new TL pole structures. Minimal ground disturbance is expected in these areas, but, if the ground is disturbed, the access road area would be revegetated using native, low-growing plant species after required TL upgrade work is completed to minimize the potential for increased soil erosion and runoff. Soils would be temporarily affected due to construction activities and tree-trimming and other maintenance activities during operation. Any stockpiled soils from the area where vegetation clearing and grading occurs, including topsoils, would be replaced following cut-and-fill activities to the extent practical and, therefore, likely not require off-site hauling of soils. However, some minimal off-site hauling may be necessary. Although not anticipated, should borrow material such as sand, gravel, rip rap, or other aggregate, such as large rocks, be required for Project Site activities, these resources may be obtained either from on-site sources, if available from on-site excavations, or from nearby permitted off-site sources.

The creation of small areas of new impervious surface (individual surface areas ranging from 0.01 to two acres, together amounting to approximately eight acres), in the form of the foundations for the central inverters and the Project substation, operations and maintenance building, and associated components, would result in a minor increase in stormwater runoff and potential increase in soil erosion. Planting of perennial and annual, non-invasive vegetation, including plants attractive to pollinators, within the limits of disturbance along with use of BMPs described in the SWPPP (see Section 1.4), such as soil erosion and sediment control measures, would minimize the potential for increased soil erosion and runoff. Following construction, implementation of soil stabilization and vegetation management measures would reduce the potential for erosion impacts during facility operations.

During operation and maintenance of the solar facility and associated interconnection facilities, minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement; inverter air filter replacement; fence repair; vegetation control; and periodic PV array inspection, repairs, and maintenance. Most of the fenced-in, developed solar facility area would be grazed by sheep to manage vegetation. Selective spot applications of herbicides may be employed around facilities and structures to control weeds. Herbicides would be applied by a professional contractor or a qualified Project technician. These maintenance activities would not result in any adverse impacts to soils on the Project Site during operations.

3.3.2.2.4 Prime Farmland

Approximately 41.3 percent (1,430 acres) of the 3,463-acre Project Site would be developed into the solar facility, and the 5.8 percent (202 acres) that is currently farmed would no longer be suitable for row crops. This would affect approximately 1,207 acres of prime farmland, amounting to approximately 50.3 percent of the total prime farmland soils at the Project Site, most of which is not currently farmed. Because the construction and operation of the solar facility would have little effect on the productivity of soils on the site and most of the site would be utilized for grazing sheep, which would have benefits to the local farming community, impacts to prime farmland would be minor. Following decommissioning of the solar facilities, the site could be utilized for a variety of types of agricultural production, including row cropping.

3.3.2.2.5 Cumulative Impacts

The Proposed Action would remove approximately 202 acres of agricultural land from row cropping uses. The RFFA Coffee County Joint Industrial Park, listed in Table 3-1 could remove current prime farmland in the area; therefore, together with the Proposed Action, would contribute to minor cumulative impacts on prime farmland.

3.4 Water Resources

3.4.1 Groundwater

3.4.1.1 *Affected Environment*

Groundwater is water located beneath the ground surface within soils and subsurface formations known as hydrogeological units or aquifers (USGS 2020). Aquifers conduct groundwater and significant quantities of water to be produced by man-made water wells and natural springs

According to the USGS, the project area is underlain by the Mississippian Carbonate Aquifer system. Bedrock consists of flat-lying Mississippian carbonates, principally the Fort Payne Chert and Tuscumbia Limestone, which constitute the most aerially extensive aquifer in the Tennessee Region. These formations weather to form a deep regolith aquifer. In many places, the carbonate bedrock contains karst features that can transmit water rapidly (Zurawski 1978). The aquifer is recharged by water which infiltrates and percolates through the overlying unconsolidated material until it enters the bedrock and aquifer. The base of the aquifer consists of contact with the underlying Chattanooga Shale. The Mississippian Carbonate Aquifer is located in the south-central area of Tennessee. This aquifer is overlain by silt loams with cherty silt loams and clay silt loams.

Groundwater recharge and discharge corresponds to topographic high and lows, respectively. Groundwater in the area can be affected by agricultural pumping and local surface water bodies with flow following local topography either toward West Fork Rock Creek and North Fork Blue Creek or Cumberland Springs Lake, Hurricane Creek, and Turkey Creek. Drinking water in the area is supplied from a surface water intake located on the Duck River or a freshwater spring located at the headwaters of Little Hurricane Creek.

The natural quality of groundwater in the Tennessee Region depends on many factors, but mainly upon the composition of rock in which the groundwater occurs. When water infiltrates the aquifer as precipitation, it is generally low in dissolved solids, soft, and slightly acidic. As it moves through the regolith, it generally remains slightly acidic and low in dissolved solids. This acidic groundwater can dissolve the carbonate rocks, resulting in water that is enriched in bicarbonate, calcium, and magnesium. As the dissolved solids increase, the water becomes harder and slightly alkaline.

3.4.1.2 *Environmental Consequences*

3.4.1.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, no Project-related impacts to groundwater would be expected to occur. Existing land use would remain a mix of mostly forested and some agricultural land, and groundwater resources would remain much as they are at the present time. However, indirect impacts to groundwater resources due to continued erosion from timbering operations could occur if these the current land uses continue by other parties.

3.4.1.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL, including installation of five new TL pole structures for the TL upgrades, all of which would be located on the Project Site. New poles would be augured into the ground to a depth equal to 10 percent of the pole's length plus an additional two feet, typically about 10 to 12 feet deep.

Beneficial, indirect impacts to groundwater could result from the change in land use from timber harvesting and agricultural use to industrial use. This would include use of BMPs associated with hazardous materials, the reduced likelihood of erosion and sedimentation, and the improvement of water quality by filtering through permanent perennial and annual, non-invasive plant cover.

No direct adverse impacts to groundwater would result from the Proposed Action. The PV panels would not have an effect on groundwater infiltration and surface water runoff because the panels would not include a runoff collection system. Rainwater would drain off the panels to the adjacent vegetated ground. Array spacing and panel movement throughout the day would minimize rain shadow effects. Installation of the new TL pole structures may intersect with the groundwater, however, the poles would be constructed of materials deemed safe for contact with groundwater.

Hazardous materials that could contaminate groundwater would be stored on the Project Site during construction. The minimal use of petroleum fuels, lubricants, and hydraulic fluids during construction and by maintenance vehicles would result in a low potential for small on-site spills. However, the use of BMPs and a site-specific Spill Prevention, Countermeasure and Control (SPCC) plan to properly maintain vehicles, avoid leaks and spills, and define procedures to immediately address any spills that did occur, would minimize the potential for adverse impacts to groundwater.

Project activities that could cause erosion during construction resulting in the movement of sediment into groundwater infiltration zones. BMPs, such as those described in TVA's BMP manual (TVA 2017a), would be used to avoid contamination of groundwater due to Project activities. However, once construction was complete and disturbed areas were re-vegetated, future erosion and sediment control would be minimized.

3.4.1.2.2.1 Project Water Needs

Water and sewer services would be required during construction of the Project. Construction-related water use would support site preparation and grading activities. The primary use of water during construction would be for compaction and dust control during grading and earthwork. Smaller quantities of water would be required for other minor uses.

Water used during construction would be provided via delivery by water trucks or Project wells. If wells are selected, SR Tullahoma would conduct groundwater drilling and testing to gather information on aquifer characteristics and develop a plan for the production well design. If required, water-based drilling muds would be collected and dewatered, with runoff occurring locally into nearby field areas. Dewatered muds would be non-toxic and could be distributed as subsoil during site grading. If determined necessary, sewer treatment would be accomplished through use of a pump-out septic holding tank. If installed, groundwater

wells and the septic holding tank would be appropriately permitted and constructed to avoid impacts to groundwater.

The primary uses of water during operation and maintenance would be for dust control, equipment washing and potential building restroom facilities. Internal access roads would not be heavily traveled during normal operation, and consequently, water use for dust control is anticipated to be limited if at all necessary. The panels are slated to be cleaned on a regular basis depending on the frequency of rainfall, proximity of arrays to sources of airborne particulates, and other factors.

Equipment washing and any potential dust control discharges would be handled in accordance with BMPs for water-only cleaning. Water needs during operation and maintenance would be provided via water trucks and would not adversely affect groundwater resources.

Conditions may change by the time facility closure and decommission becomes necessary. A final Decommissioning and Closure Plan would be created based on site conditions at the time of facility closure.

The Project would comply with NPDES requirements by preparing and implementing a SWPPP and filing a NOI to comply with the General Construction Stormwater NPDES Permit. The plan would include procedures to be followed during decommissioning to prevent erosion and sedimentation, non-stormwater discharges, and contact between stormwater and potentially polluting substances.

Decommissioning and site reclamation would likely be staged in phases, allowing for a minimal amount of disturbance and requiring minimal dust control and water usage. It is anticipated that water usage during decommissioning and site reclamation would not exceed construction or operational water usage.

3.4.1.2.2.2 Overall Groundwater Impacts

Due to the small volume of groundwater anticipated to be needed for the Project, impacts to the local aquifers and groundwater in general are not anticipated. The use of BMPs and a SWPPP would reduce the possibility of any on-site hazardous materials reaching the groundwater during operation or maintenance. Overall, adverse impacts to groundwater would not be anticipated.

Currently, most of the on-site land use is forest management with timbering operations, which provides for the possibility of eroding soils to runoff and percolate into the groundwater. The construction and operation of the Proposed Action would reduce erosion, resulting in a beneficial, though minor, indirect impact to groundwater.

3.4.1.2.2.3 Cumulative Impacts

Land use on the Project Site would change from forest management with timbering operations and agricultural uses to a mix of industrial and agricultural (sheep pasture) uses. The slight increase in impervious surface may inhibit groundwater infiltration and recharge to the local aquifer. The surficial aquifer system and the Mississippian Carbonate Aquifer underlies the Project Site and is recharged by topographic highs. Groundwater flow follows local topography either toward West Fork Rock Creek and North Fork Blue Creek or Cumberland Springs Lake, Hurricane Creek, and Turkey Creek. The RFFA Coffee County Joint Industrial Park, listed in Table 3-1, would likely include paving the land surface and

diverting surface water; due to this, groundwater recharge would be expected to be lowered in the vicinity of that project. Due to the small areas that would change as a result of the Project and the RFFAs, cumulative impacts of past, present, and RFFAs, together with the Proposed Action, on groundwater would be expected to be minor.

3.4.2 Surface Water and Wetlands

3.4.2.1 *Affected Environment*

3.4.2.1.1 Regional Setting

The project area is within two hydrologic unit code (HUC)-10 sub-basins of Upper Elk [HUC 0603000304]: Tims Ford Lake – Elk River [HUC 0603000304] and a small portion of Mulberry Creek [HUC 0603000305] (Figure 3-5; USGS 1987; USGS 2022). Both watersheds are located within Tennessee. The TL is contained within the Tims Ford Lake – Elk River watershed. The Upper Elk watershed drains approximately 1,270 square miles. On-site surface waters in the eastern portion of the Project Site drain into North Fork Blue Creek, which drains into Blue Creek and West Fork Rock Creek. On-site surface waters in the northeast portion of the portion of the Project Site drain into West Fork Rock Creek, which drains into Rock Creek. On-site surface waters in the western portion of the Project Site drain into Hurricane Creek, which drains southeast to its confluence with Elk River. On-site surface waters within the TL drain into Spring Creek, Turkey Creek, and Poorhouse Creek. Poorhouse Creek also drains into Rock Creek. All streams ultimately drain into the Elk River, located approximately eight miles southeast of the Project Area.

Precipitation in the project area averages about 58.6 inches per year. The average annual air temperature ranges from a maximum of 69 degrees Fahrenheit (°F) to a minimum of 47°F, with a winter average of 40°F and a summer average of 75°F in the summer months (NOAA 2021a). Stream flow varies with rainfall and averages 29 inches of runoff per year (USGS 2008).

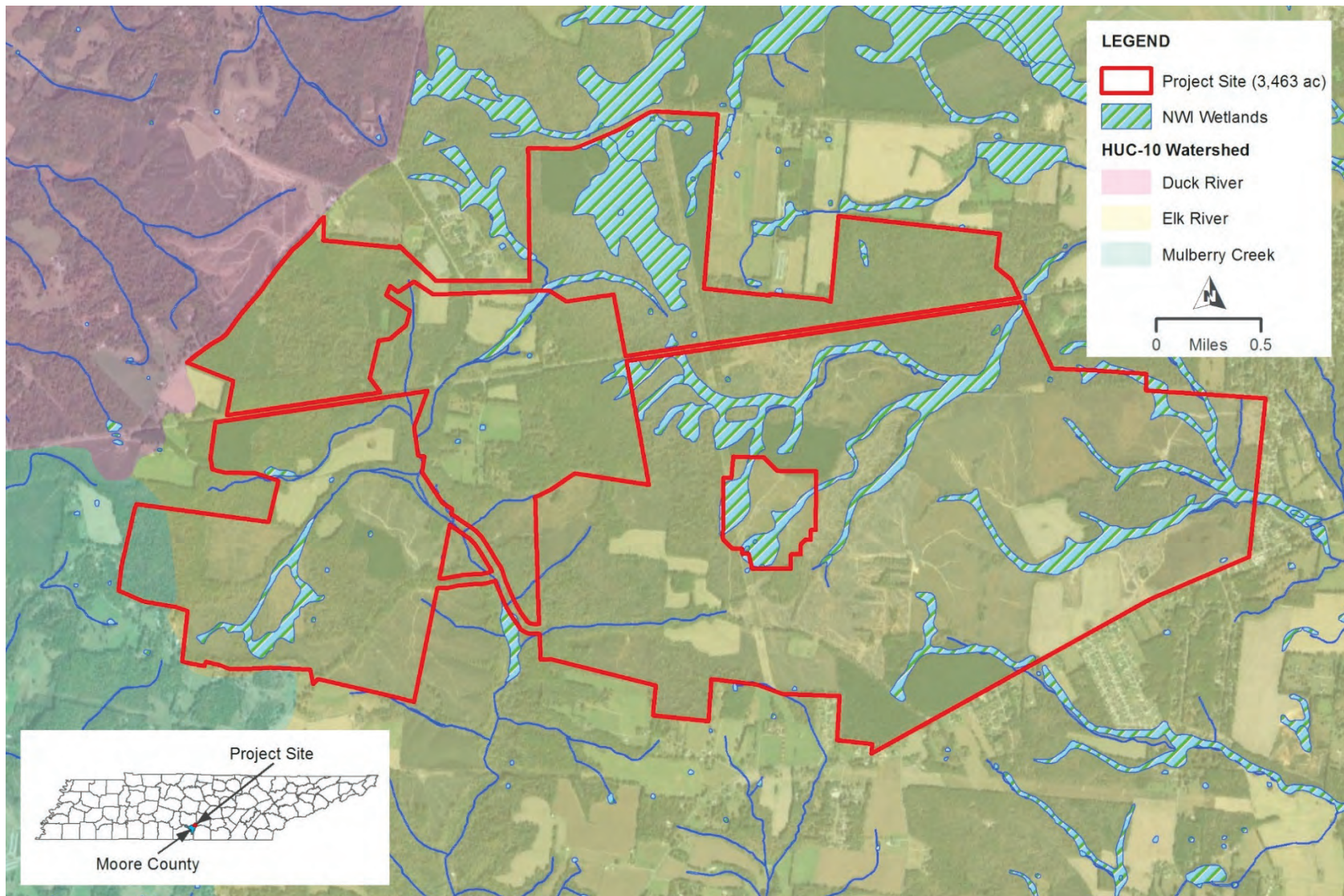


Figure 3-5. NWI Wetlands and HUC-10 Watersheds in the Project Site Vicinity

3.4.2.1.2 Surface Water and Wetlands

Surface water is any water that flows above ground and includes, but is not limited to, streams, ponds, lakes, and wetlands. Streams can be further classified as perennial, intermittent, or ephemeral based on the occurrence of surface flow. Surface waters with certain physical and hydrologic characteristics (defined bed and bank, ordinary high-water mark, or specific hydrologic, soil, and vegetation criteria) are considered Waters of the U.S. (or jurisdictional waters) and are under the regulatory jurisdiction of USACE. CWA is the primary federal statute that governs the discharge of pollutants and fill materials into Waters of the U.S. under Sections 401, 402, and 404. The limits of Waters of the U.S. are defined through a jurisdictional determination have been submitted and are currently in review by USACE. The Tennessee Department of Environmental Control (TDEC) regulates state waters and has jurisdiction over water quality. For TDEC, a Hydrologic Determination (HD) form is required for both streams and wet weather conveyances (WWCs). A HD Request has been submitted and is currently in review by TDEC. The following information references the surface waters and wetlands by their federally jurisdictional classifications (USACE).

Field surveys of the Project Site conducted between April and June 2021 and in November 2021 documented a total of 30 jurisdictional perennial or intermittent streams (31,082 linear feet [LF] and 27,011 LF, respectively), 16 jurisdictional ephemeral streams (6,591 LF), 18 jurisdictional wetlands, and 3 jurisdictional open waters (ponds). The Project Site also includes 20 non-jurisdictional ditches (12,721 LF), four non-jurisdictional open waters (ponds; 1.27 acres), and 11 non-jurisdictional wetlands (3.13 acres; Appendix A). Ditches did not have an ordinary high-water mark or bed and bank while ephemeral streams did have these characteristics. Field surveys of the TL upgrade locations conducted in January and February 2022 identified five jurisdictional streams and five ephemeral streams, totaling 633 LF. One named stream was delineated in the TL locations, Spring Creek. Figures 3-6, 3-7, 3-8, 3-9, and 3-10 depict the delineated perennial and intermittent streams, ephemeral streams, and wetlands on the Project Site and in the TL upgrade locations. Named streams on the Project Site consist of North Fork Blue Creek, West Fork Rock Creek, and Hurricane Creek. Wetland determinations were performed according to USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2012).

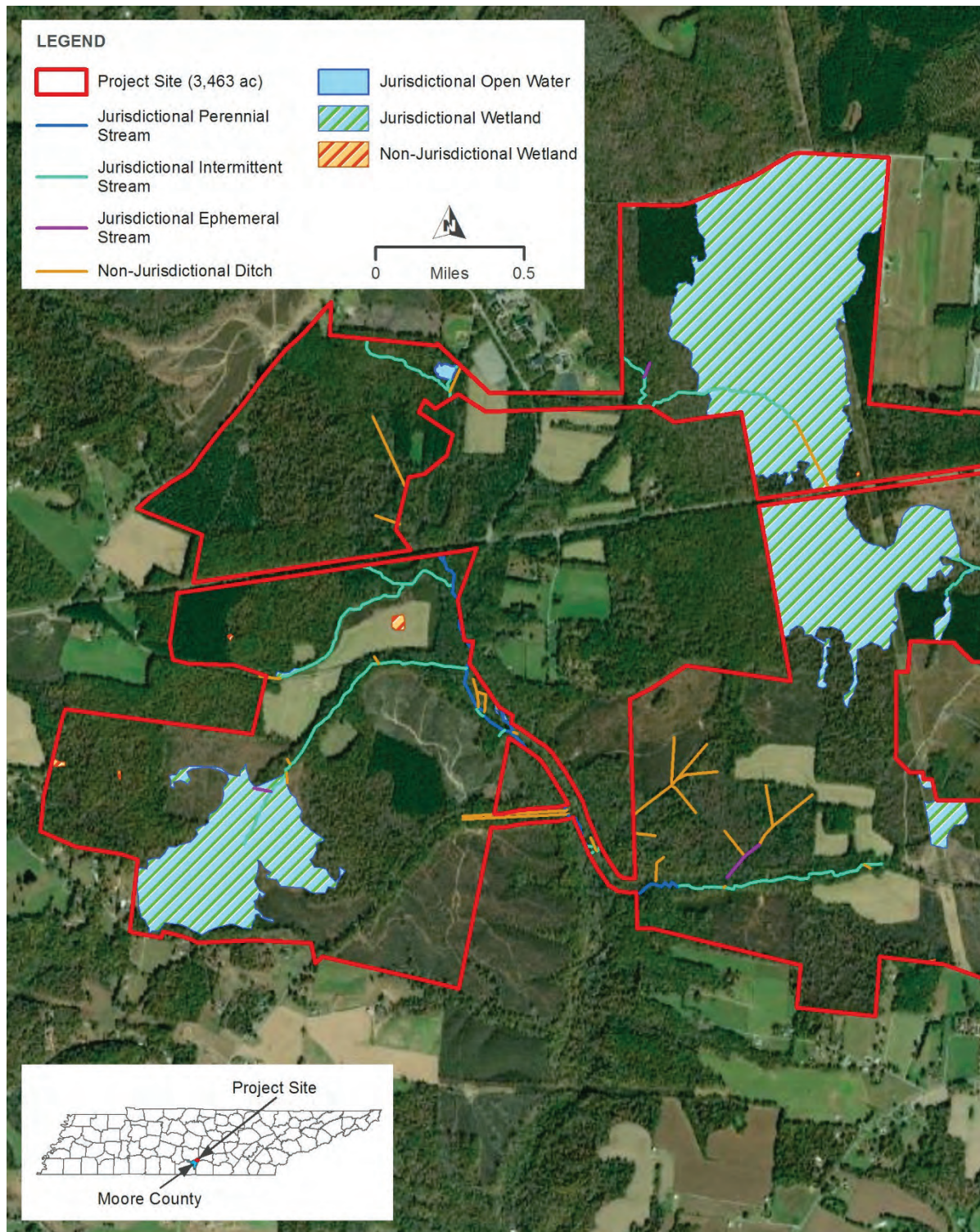


Figure 3-6. Aerial Photo Showing Delineated Wetlands and Streams on the Western Portion of the Project Site

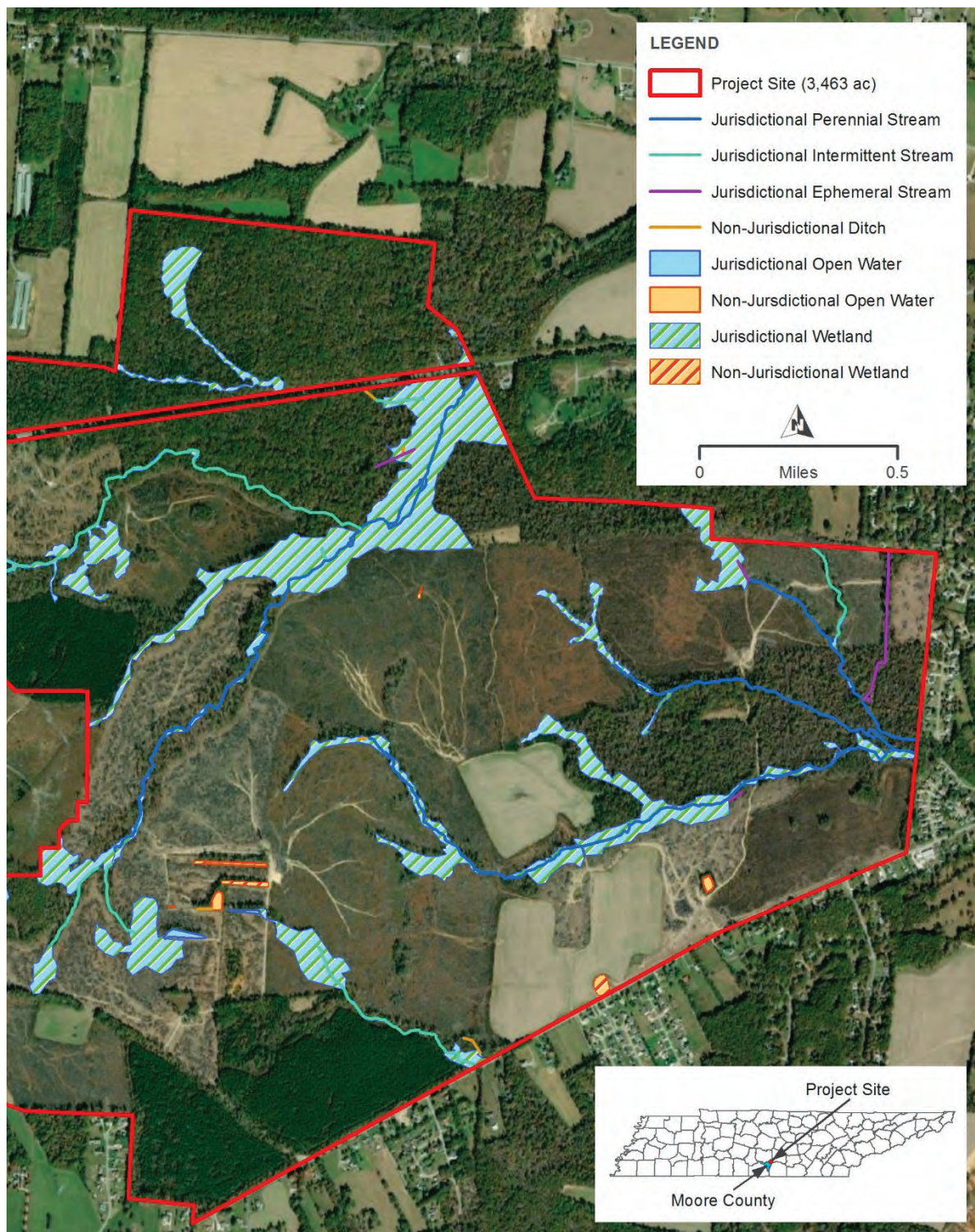


Figure 3-7. Aerial Photo Showing Delineated Wetlands and Streams on the Eastern Portion of the Project Site

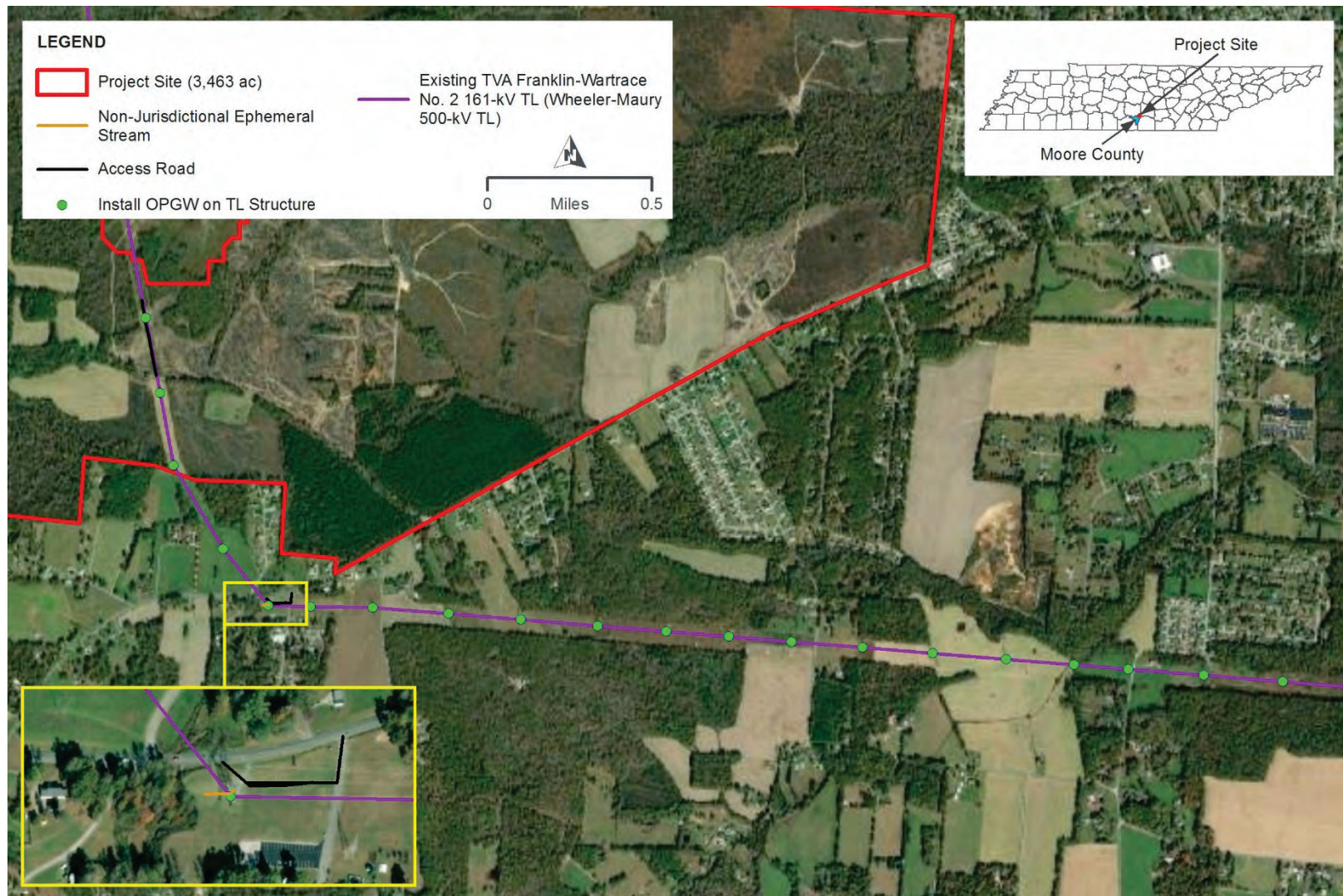


Figure 3-8. Aerial Photo Showing Streams and Wetlands Along the Transmission Line on the Western Portion of the Project

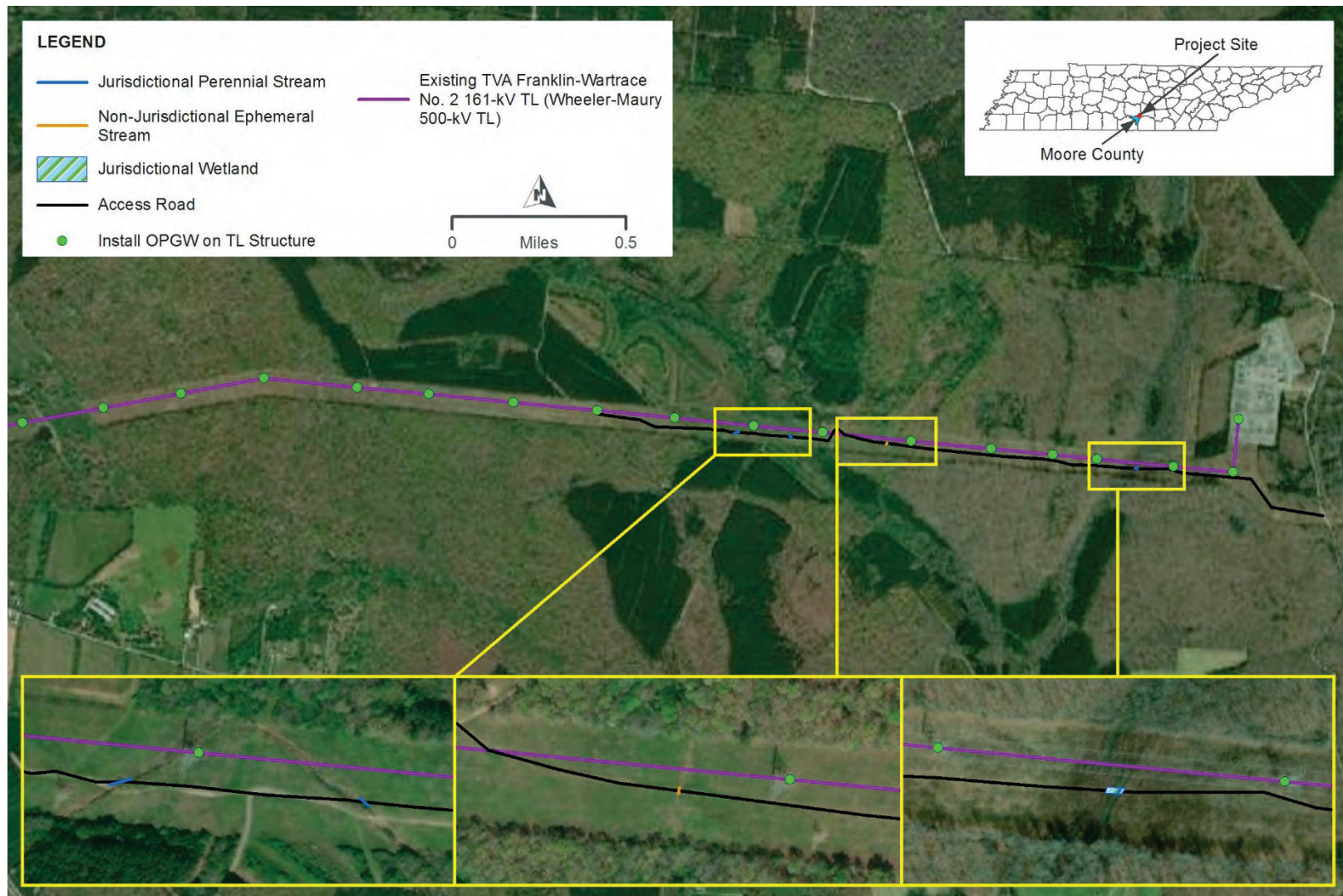


Figure 3-9. Aerial Photo Showing Streams and Wetlands Along the Transmission Line on the Eastern Portion of the Project

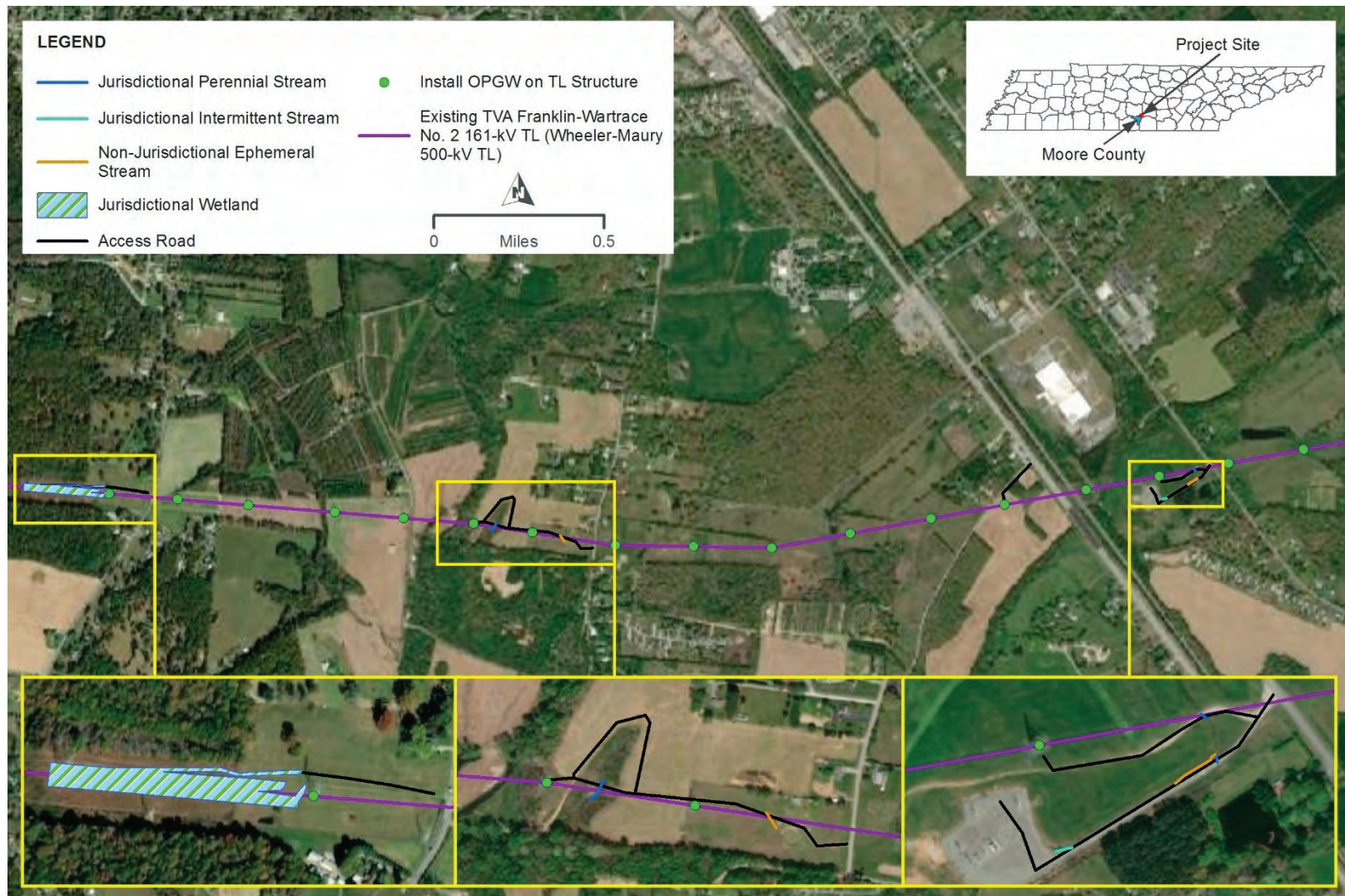


Figure 3-10. Aerial Photo Showing Streams and Wetlands Along the Transmission Line on the Central Portion of the Project

3.4.2.1.2.1 Water Quality

The CWA requires states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to USEPA with these data. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. Two streams on the Project Site are currently listed as impaired: one unnamed tributary to South Fork Blue Creek (which is off site) and North Fork Blue Creek (USEPA 2019). Blue Creek within Moore County is listed as impaired due to livestock grazing within riparian zones and causing *Escherichia coli* contamination or changes in the riparian vegetation (TDEC 2020). No impaired waters are present in the TL upgrade locations. Table 3-4 provides a listing of local streams with their state designated uses

Table 3-4. Streams in the Project Site Vicinity and Their Uses

Stream	Use classification ¹					
	IWS	FAL	REC	LWW	IRR	DOM
Rock Creek ²	X	X	X	X	X	
Blue Creek ²	X	X	X	X	X	X
Hurricane Creek	X	X	X	X	X	
Elk River ²		X	X	X	X	

Source: USEPA 2017

¹Codes: IWS = Industrial Water Supply; FAL = Fish and Aquatic Life; REC = Recreation; LWW = Livestock Watering and Wildlife; IRR = Irrigation; DOM = Domestic Water Supply

²Not in project area, shown for flow network.

3.4.2.1.2.2 Wetlands

Wetlands are areas saturated by surface or groundwater at a frequency and duration sufficient to support vegetation adapted to saturated conditions. Examples of wetlands are bottomland forests, swamps, wet meadows, isolated depressions, and shoreline fringe along watercourses or impoundments (33 CFR § 328.3). Wetland habitat provides valuable public benefits including flood storage, erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

In the Interior Plateau Level III ecoregion (USEPA 2017), wetlands are composed of palustrine systems. Palustrine systems are non-tidal or freshwater complexes, dominated by trees, shrubs, or persistent emergent vegetation (Cowardin et al. 1979). Palustrine wetlands within this region can include bottomland or riparian hardwood forests, scrub-shrub wetlands, isolated ponds, or emergent wetlands typically composed of wet meadows and marshes. On the Project Site, wetlands are relatively abundant but primarily restricted to the bottomlands of perennial streams on the Project Site.

The National Wetland Inventory (NWI) was consulted for the Project Site prior to field surveys in April 2021. This nationwide dataset depicts potential wetland areas based on wetland signatures determined through aerial photography. These data are presented in Table 3-5. The portion of the Project Site within the Tims Ford Lake – Elk River watershed contains a large percentage of wetland cover relative to the broader watershed area (Table 3-5). Therefore, based on NWI data, the Project Site contains a relatively large percentage of wetland resources compared to the surrounding landscape within the broader watershed area. This was supported by the field survey findings, wherein it was

determined that the Project Site is approximately 16 percent wetlands. The TL area is approximately 17 percent wetlands.

Table 3-5. NWI Wetland Cover by Watershed Relative to NWI Wetland Cover on the Project Site

Watershed Name (HUC-10) --Solar Site Tributary Name	Total NWI wetland cover in Watershed	NWI Wetland Cover on the Project Site
Tims Ford Lake – Elk River (0603000304)	5.7%	4.5%
Mulberry Creek (0603000305)	2.8%	0%

Source: USFWS 2017

Within the 3,463-acre survey area, approximately 559 wetland acres were identified on the Project Site during field surveys (Figure 3-6). Identified wetlands consist of bottomland habitat associated with two perennial streams: West Fork Rock Creek and North Fork Blue Creek. Wetland types consist of forested, scrub-shrub, and emergent (Table 3-6). Two emergent wetlands, totaling approximately two acres, were identified in the TL upgrade locations during field surveys.

Table 3-6. Delineated Wetland Acreage by Habitat and Drainage Basin on the Project Site and TL Upgrade Locations

Wetland Habitat Type	Tims Fork Lake - Elk River Drainage Basin	Mulberry Creek Drainage Basin	Total
Forested Wetland	83.9	0.1	84.0
Scrub-shrub Wetland	0.1	0	0.1
Forested/Scrub-Shrub Wetland	39.0	0	39.0
Forested/Emergent Wetland	419.6	0	419.6
Emergent/Scrub-shrub Wetland	5.9	0	5.9
Emergent Wetland	12.5	0	12.5
Grand Total	561.1	0.1	561.2

Using TDEC Tennessee Rapid Assessment Method (TRAM) quantitative rating form, wetlands on the Project Site were evaluated by their functions and classified into three categories: low quality, moderate quality, and exceptional quality. Low-quality wetlands are degraded aquatic resources that may exhibit low species diversity, minimal hydrologic input and connectivity, recent or on-going disturbance regimes, and/or predominance of non-native species. These wetlands provide low functionality and are considered of low value. Moderate-quality wetlands provide functions at a greater value due to less degradation and/or due to their habitat, landscape position, or hydrologic input. Moderate-quality wetlands are considered healthy water resources of value. Disturbance to hydrology, substrate and/or vegetation may be present to a degree at which valuable functional capacity is sustained and there is reasonable potential for restoration. Exceptional-quality wetlands offer superior functions and values within a watershed or are of regional/statewide concern. These wetlands may exhibit little to no recent disturbance, provide substantial large-scale stormwater storage, sediment retention, and toxin absorption, contain mature vegetation communities, or offer habitat to rare species. Conditions in exceptional-quality wetlands often represent restoration goals for wetlands functioning at a lower capacity.

Wetlands on the Project Site range from low to exceptional quality, per the TRAM rating results (Table 3-7). Low-quality wetlands are typically categorized as roadside, isolated, or previously logged and, during the field survey, were typically small and lacked influence on downstream water quality. Wetlands in stream floodplains primarily represent exceptional quality habitat, exhibiting a healthy condition and desirable suite of wetland functions. Due to the geomorphic position and large size, these wetlands offer value in flood reduction, sediment retention, and toxin absorption. However, disturbance has resulted in some reduction of functional capacity due to narrow upland buffers or timber operations that have impacted natural wetland integrity. Although some disturbance may be present, the majority of the wetlands on site were considered moderate quality, providing healthy wetland functions to the surrounding landscape.

Table 3-7. Delineated Wetland Acreage by Wetland Condition within each Drainage Basin on the Project Site and TL Upgrade Locations

Wetland Condition TRAM Category¹	Tims Ford - Elk River Drainage Basin	Mulberry Creek Drainage Basin	Total
Low Quality	23.4	0	23.4
Moderate Quality	531.9	0.4	532.4
Exceptional Quality	5.4	0	5.4
Grand Total	560.8	0.4	561.2

¹TRAM = scores wetland quality by functional capacity

The Tims Ford - Elk River basin of the Project Site contains the majority of the on-site wetlands, which are predominately a mosaic of forested and emergent wetlands. This portion of the Project Site includes timbered areas, as well as naturalized wetlands. The wetlands are found along the major stream channels, North Fork Blue Creek, West Fork Rock Creek, and Hurricane Creek. A large wetland system is located north of SR 55, in the northern portion of the Project Site. The forested wetlands are dominated by red maple, tulip poplar, sweet gum, and black gum. The scrub-shrub wetlands are dominated by bluestem broomsedge, goldenrod, sweetgum, and mixed grasses. The emergent wetlands are dominated by slender rush, shallow sedge, panic grass, spike rush, cattail, and other mixed grasses.

Many of the floodplain wetlands in the Elk River basin exhibited inundated or saturated soils. Upland vegetative buffers are lacking, and surrounding areas are disturbed due to recent logging operations. However, the floodplain system was considered intact, receiving and discharging significant hydrology, and providing high quality habitat. The wetlands within the Elk River basin are dominated by exceptional quality wetlands, and then followed by moderate wetlands.

The Mulberry Creek basin contains an isolated 0.09-acre wetland. This moderate-quality forested wetland is dominated by black gum, willow oak, buttonbush, and sweet gum. The surrounding area is relatively undisturbed upland.

3.4.2.2 Environmental Consequences

3.4.2.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility

at this location; therefore, minor indirect impacts to surface waters or wetlands would occur if current land use practices continued.

3.4.2.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Soil disturbances associated with Project installation and construction activities could result in adverse water quality impacts. Soil erosion and sedimentation could impact surface water quality. Construction activities would be performed using BMPs to minimize these impacts. TVA would comply with all appropriate local, state and federal permit requirements. Additionally, SR Tullahoma would maintain a herd of sheep on the Project Site to help control the growth of tall vegetation and reduce the need for mowing and herbicide use during the operation of the solar facility. The sheep would be frequently rotated between temporarily fenced paddocks within the permanent Project fencing on a 40- to 60-day cycle. Water needs would be provided by troughs filled from a Project well and/or municipal water taps. The sheep would be excluded from sensitive water resource areas such as streams and wetlands.

As discussed in Section 1.4, an NPDES Construction Storm Water General permit would be needed since more than one acre would be disturbed for the Project. The permit also requires the development and implementation of a SWPPP. In addition, either Nationwide Permit(s) or an Individual Permit would be required from USACE for water feature disturbances affecting Waters of the U.S., including USACE-jurisdictional perennial and intermittent streams and wetlands. An Aquatic Resource Alteration Permit (ARAP) would be required from TDEC for alteration of TDEC-regulated streams and wetlands. TVA is also subject to EO 11990, Protection for Wetlands. EO 11990 requires federal agencies to avoid wetland impacts to the extent practicable; minimize wetland destruction, loss, or degradation; and preserve and enhance natural and beneficial wetland values while carrying out agency responsibilities. BMPs, as described in TVA's BMP manual (TVA 2017a) and the TDEC *Tennessee Erosion and Sediment Control Handbook* (TDEC 2002), would be used to avoid contamination of surface water on and downstream of the Project Site. The use of BMPs for controlling soil erosion and runoff would minimize these potential impacts to surface water. Construction of on-site stormwater detention basins would allow sediment to settle out prior to release. Managed sheep grazing on-site is expected to help the soil retain nutrients, allowing for a higher density of grasses, which can help reduce erosion during the operation of the solar facility (American Solar Grazing Association 2021).

3.4.2.2.2.1 Streams on the Project Site

The proposed solar PV facility has been designed to avoid increasing the loading of any pollutant/contaminant to a stream currently listed on the CWA Section 303(d) list as a result of any discharges to surface waters. Additionally, impervious surfaces prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams. Clearing of vegetation and groundcover and the addition of impervious surfaces could alter the current stormwater flows. The Proposed Action Alternative could increase the impervious cover on the Project Site by approximately eight acres, thus altering and possibly increasing the concentrated stormwater flow off the Project Site. This flow would be properly treated by diverting the stormwater discharge to Project sedimentation basins during construction and with implementation of stormwater BMPs.

Impacts to USACE-jurisdictional waters would be limited to 490 LF of jurisdictional ephemeral streams for the installation of solar arrays. These impacts would be subject to the conditions of the Section 404 permit(s) obtained for the Project, as described in Section 1.4. Effects to non-USACE-jurisdictional/TDEC-regulated waters would total 7,856 LF, with 271 LF of impact to non-USACE-jurisdictional ditches for the construction of road crossings and 7,095 LF of impact to non-USACE-jurisdictional ditches for the installation of solar arrays. While impacts to non-USACE-jurisdictional ditches do not require a TDEC ARAP, the Project would follow the requirements of the Tennessee Water Quality Control Act (T.C.A. § 69-3-108(q)) to minimize effects to these water resources.

As a standard practice, the Project would employ BMPs to protect streams, as described in Section 2.2 and in the TVA BMP Manual (TVA 2017a). Impacts to jurisdictional perennial and intermittent streams, which are regulated by USACE, are not expected. In accordance with TVA requirements, 50-foot buffers surrounding wetlands and non-impaired perennial and intermittent streams in developed portions of the Project Site would be maintained as an avoidance measure, while 60-foot buffers would be maintained surrounding impaired perennial and intermittent streams on the Project Site.

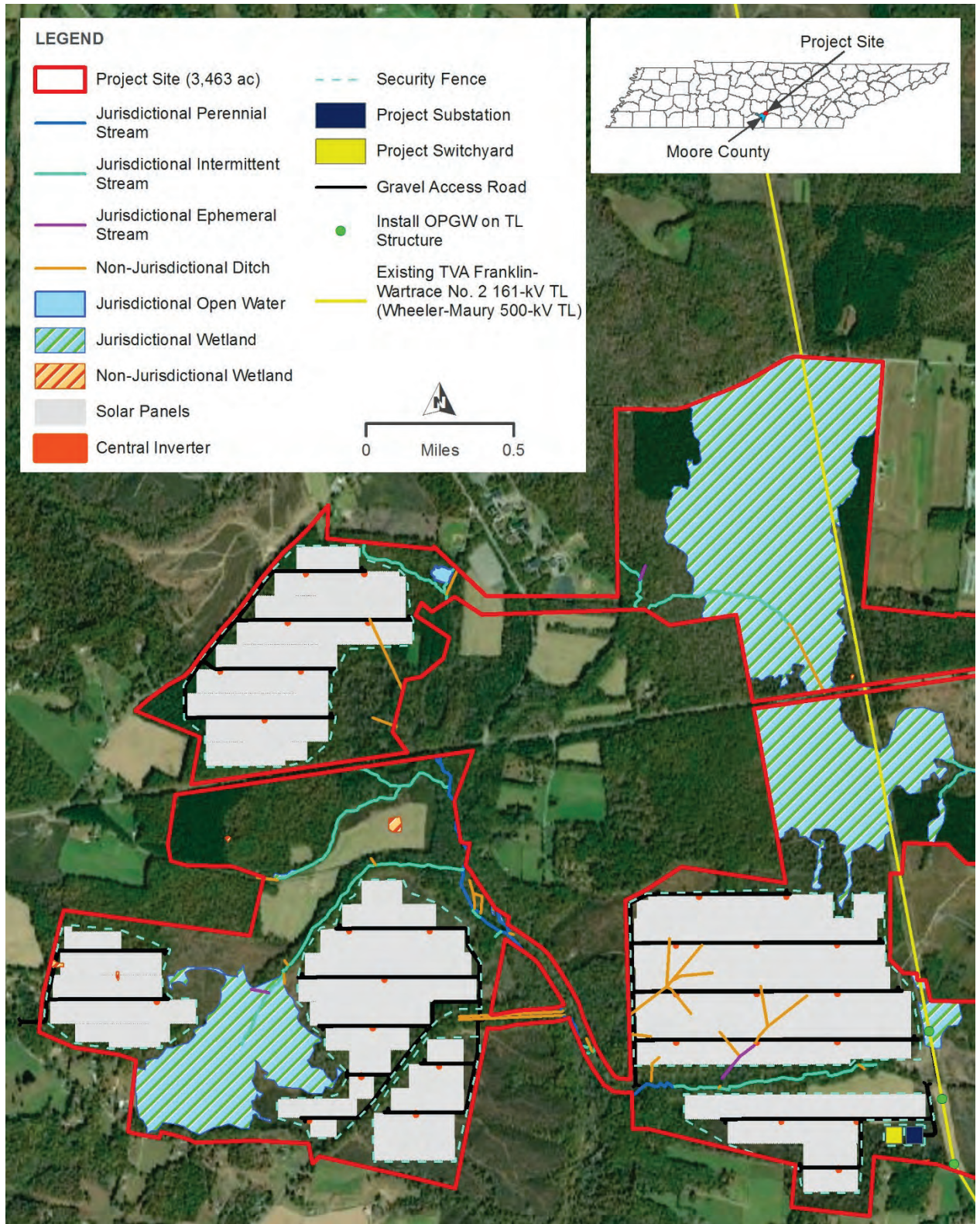


Figure 3-11. Proposed Project Components in Relation to Streams and Wetlands on the Western Portion of the Project Site

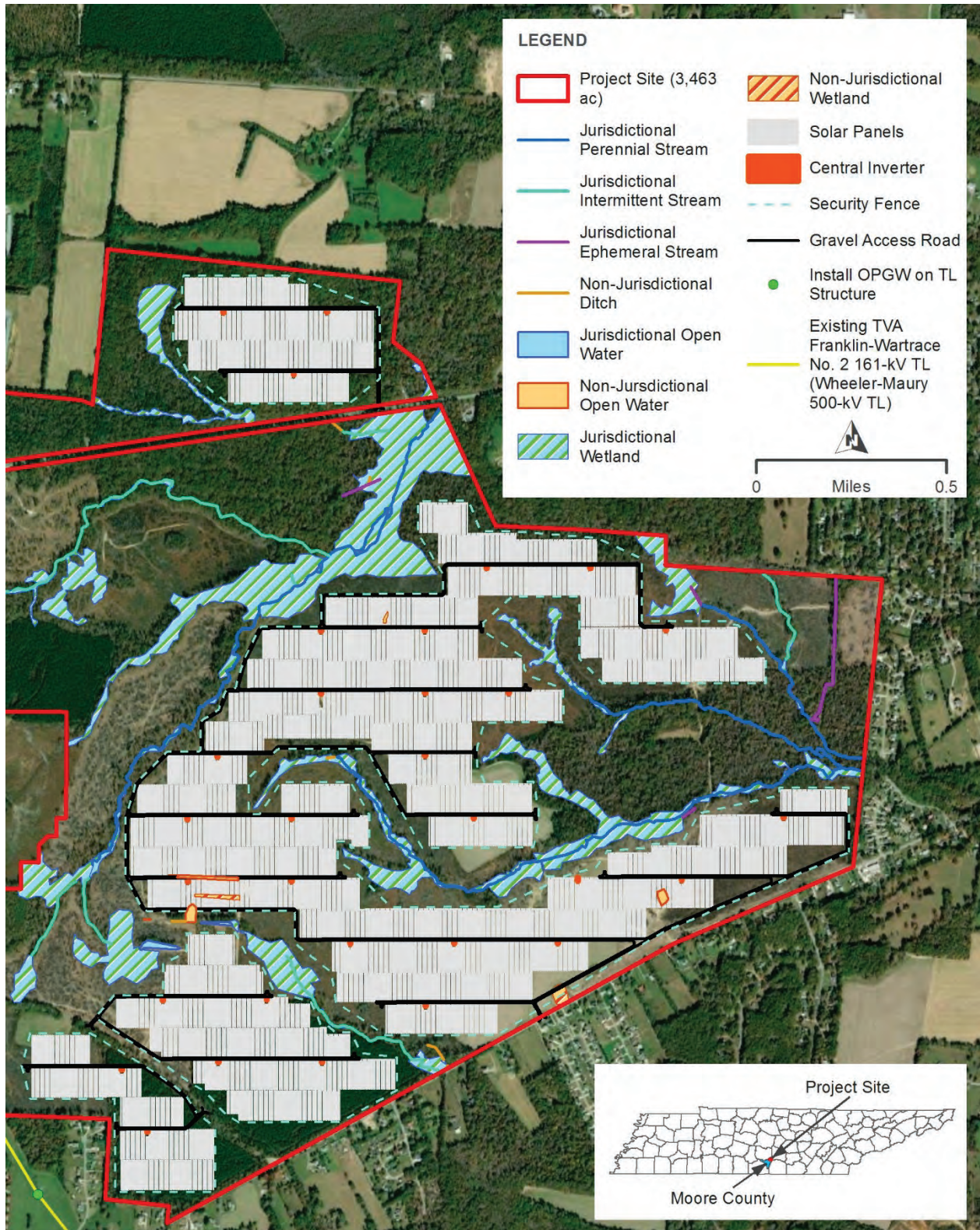


Figure 3-12. Proposed Project Components in Relation to Streams and Wetlands on the Eastern Portion of the Project Site

3.4.2.2.2.2 Wetlands on the Project Site

No USACE-jurisdictional wetlands are anticipated to be affected by the Project. A total of 1.9 acres of non-USACE-jurisdictional open waters and 1.4 acre of non-USACE-jurisdictional/TDEC-regulated wetlands would be impacted (Figure 3-11). Non-USACE-jurisdictional open waters would have 0.4 acre of impact for road crossings and 1.1 acres of impact for solar panel blocks. Non-USACE-jurisdictional wetlands would have 0.2 acres of impact for road crossings and 1.2 acres of impact for solar panel blocks. Non-USACE-jurisdictional impacts would be the subject of ARAP permits and associated permit conditions, as regulated by TDEC.

Conceptual and engineering design considered wetland presence and implemented avoidance strategies throughout the planning process, in compliance with the CWA and EO 11990. However, complete avoidance was not feasible. Most of the wetlands on the Project Site would be avoided. In addition, 50-foot buffers would surround on-site wetlands, regardless of regulatory jurisdiction, and these buffers would be maintained to provide an adequate upland vegetative buffer to further sustain wetland functions. Indirect impacts would be avoided through the implementation of an erosion control plan and measures, such as silt fencing, to prevent sedimentation in wetlands during construction. Likewise, implementation of the Project-specific stormwater management plan would ensure hydrologic patterns on site are maintained in a manner that does not alter wetlands. Managed sheep grazing would be employed to maintain low vegetation height and would reduce the negative impacts of herbicide use or other vegetation control measures.

3.4.2.2.2.3 Transmission Line Upgrades

TL upgrade activities that would be necessary to interconnect the solar PV facility to TVA's existing electrical transmission network could result in stream and wetland impacts. The installation of the OPGW within the TL upgrade locations would not require pole replacements along the existing ROW. TVA would install five new pole structures adjacent to the Project substation on the Project Site. No poles would be installed within the 50- to 60-foot avoidance buffers around wetlands and streams. Typically, fiber installation requires vehicular access along the ROW to each TL structure in order to perform aerial work. Access across wetlands located in the ROW would be conducted in accordance with wetland BMPs to minimize soil compaction and ensure only temporary impacts result (TVA 2017a). This includes use of low ground pressure equipment, wetland mats, and dry season work scheduling. Permanent stream crossings that cannot be avoided would be designed to not impede runoff patterns and the natural movement of aquatic fauna and would comply with appropriate USACE permit requirements. Temporary stream crossings and other construction and maintenance activities associated with the TL upgrades would comply with appropriate state permit requirements and TVA requirements as described in TVA's BMP manual (TVA 2017a). This includes use of low-ground pressure equipment, wetland mats, and/or dry season work scheduling.

3.4.2.2.2.4 Operations and Maintenance

Maintenance activities associated with operation of the solar PV facility would include, but would not be limited to, periodic inspections, repairs, possibly limited herbicide and/or pesticide use, battery replacement, mowing, and potentially panel cleanings. Managed sheep grazing would also be implemented to reduce the need for regular mowing and herbicide use, as well as to continue to utilize the land as an agricultural resource.

Heavy equipment would be inspected for leaks, and any underground wire installation and general heavy equipment activity would be conducted in a manner to minimize soil and

vegetative cover disturbance. The Project would use grazing sheep to manage vegetation within most of the fenced-in, developed solar facility area. Selective spot applications of herbicides may be employed around facilities and structures to control weeds. Herbicides would be applied by a professional contractor or a qualified Project technician and per the USEPA-approved label. These maintenance activities would not result in any adverse impacts to water resources on the Project Site during operations.

During operations, the Project Site would not require potable water or a water treatment system to clean the panels as it would be expected that modules would be cleaned by precipitation. However, if modules need to be manually cleaned, purified water, free of detergents and additives, would be trucked-in and would produce little to no discharge.

3.4.2.2.2.5 Cumulative Impacts

As depicted on Figure 3-11, the Project is anticipated to result in the fill of 490 LF of USACE-jurisdictional ephemeral streams for solar panel arrays, 7,366 LF of non-USACE-jurisdictional ditches for road crossings and solar panel arrays, 1.9 acres of non-USACE-jurisdictional open waters for road crossings and solar panel arrays, and 1.4 acres of non-USACE-jurisdictional/TDEC-regulated wetlands for road crossings and solar panel arrays. There would be no direct impacts to USACE-jurisdictional perennial streams, intermittent streams, open waters, or wetlands. Following construction of the Project, the existing functional capacity of the non-USACE-jurisdictional wetland area where the fill would occur is anticipated to be sustained. These impacts would be permitted by CWA Section 404/401 permits through USACE and TDEC, as applicable to the jurisdiction of these waters. As discussed in Section 1.4, if any additional USACE-jurisdictional stream or wetland impacts could not be avoided by the Project, these would likewise be permitted through USACE and TDEC, and mitigation may be required. Similarly, any work within USACE-jurisdictional wetlands or effects to USACE-jurisdictional streams associated with the TL upgrades would be conducted with adherence to BMPs and, for wetlands, in compliance with wetland mandates that deter reasonably foreseeable environmental trends and planned actions.

Cumulative impact analysis of wetland and stream effects takes into account waterbody loss at a watershed scale currently and within the reasonable and foreseeable future. Past, present, and RFFAs within the affected watersheds are either underway or planned and would affect approximately 4,517 acres of agricultural land and several hundred acres of forested land. These developments consist of road improvement projects, manufacturing complexes, industrial expansion, and associated railway access. Similar to the Project, these developments would also be subject to CWA jurisdiction, ensuring current and foreseeable wetland impacts are considered, permitted, and/or mitigated in accordance with wetland regulations. This regulatory oversight ensures maintenance of the chemical, biological, and physical integrity of the aquatic environment, including wetlands, within these watersheds for the long term. Reasonably foreseeable environmental trends and planned actions are considered in the CWA permitting process to ensure individual waterbody impacts do not collectively result in degradation to Waters of the U.S., including jurisdictional wetland and stream resources. Due to USACE and TDEC oversight as well as implementation of BMPs and wetland mandates, the Project is anticipated to contribute minimal impacts to cumulative stream and wetland impacts at the watershed scale.

3.4.3 Floodplains

3.4.3.1 *Affected Environment*

A floodplain is the relatively level land along a stream or river that is subject to periodic flooding. The land area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. The land area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain.

Based on Moore, Coffee, and Franklin County Flood Insurance Rate Map (FIRM) panels, no Federal Emergency Management Agency (FEMA) floodplains are mapped within the Project Site (Figure 3-13). Portions of the TL proposed to be upgraded occur within the 100-year floodplain (Figure 3-14).

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

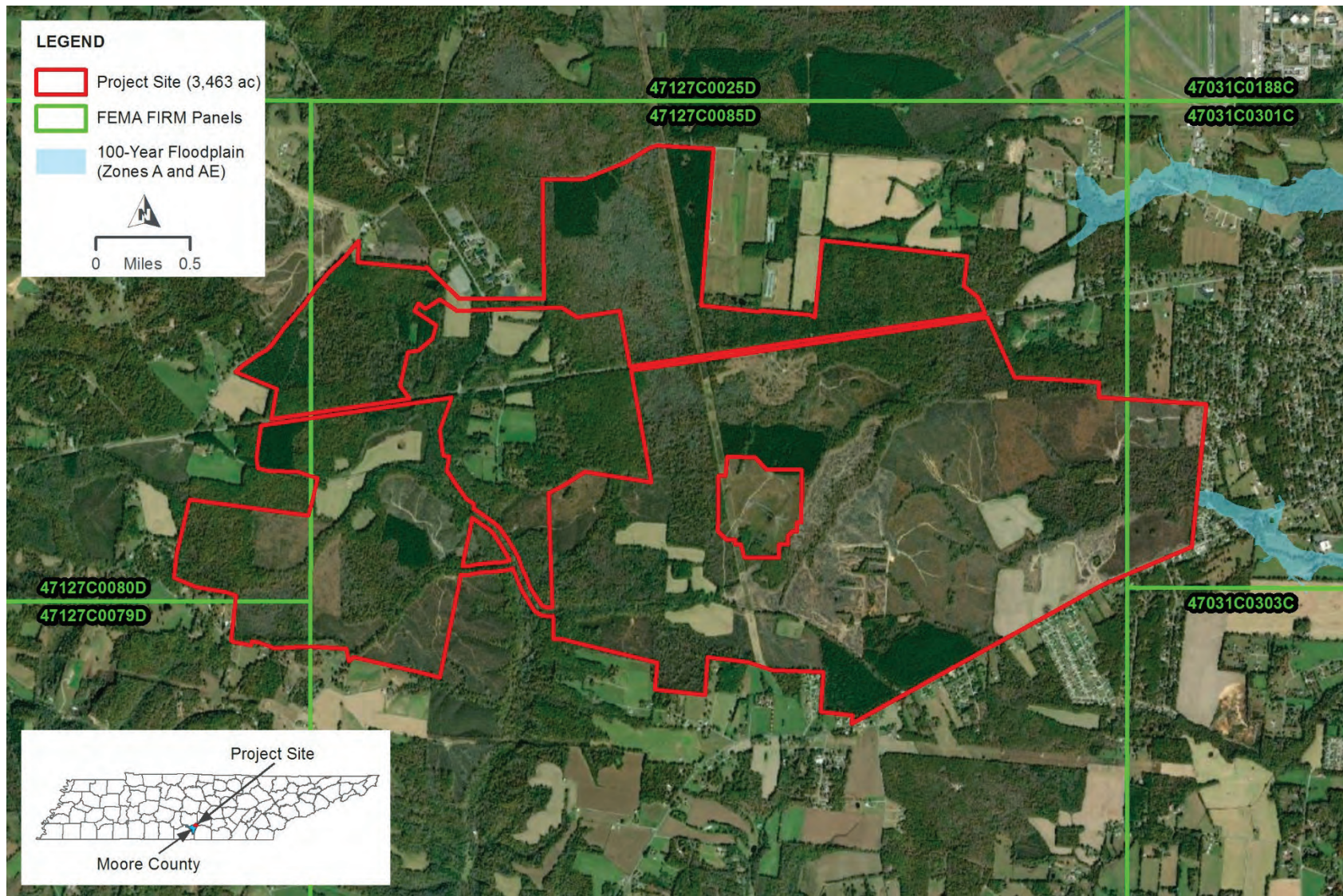


Figure 3-13. Floodplains in the Project Site vicinity

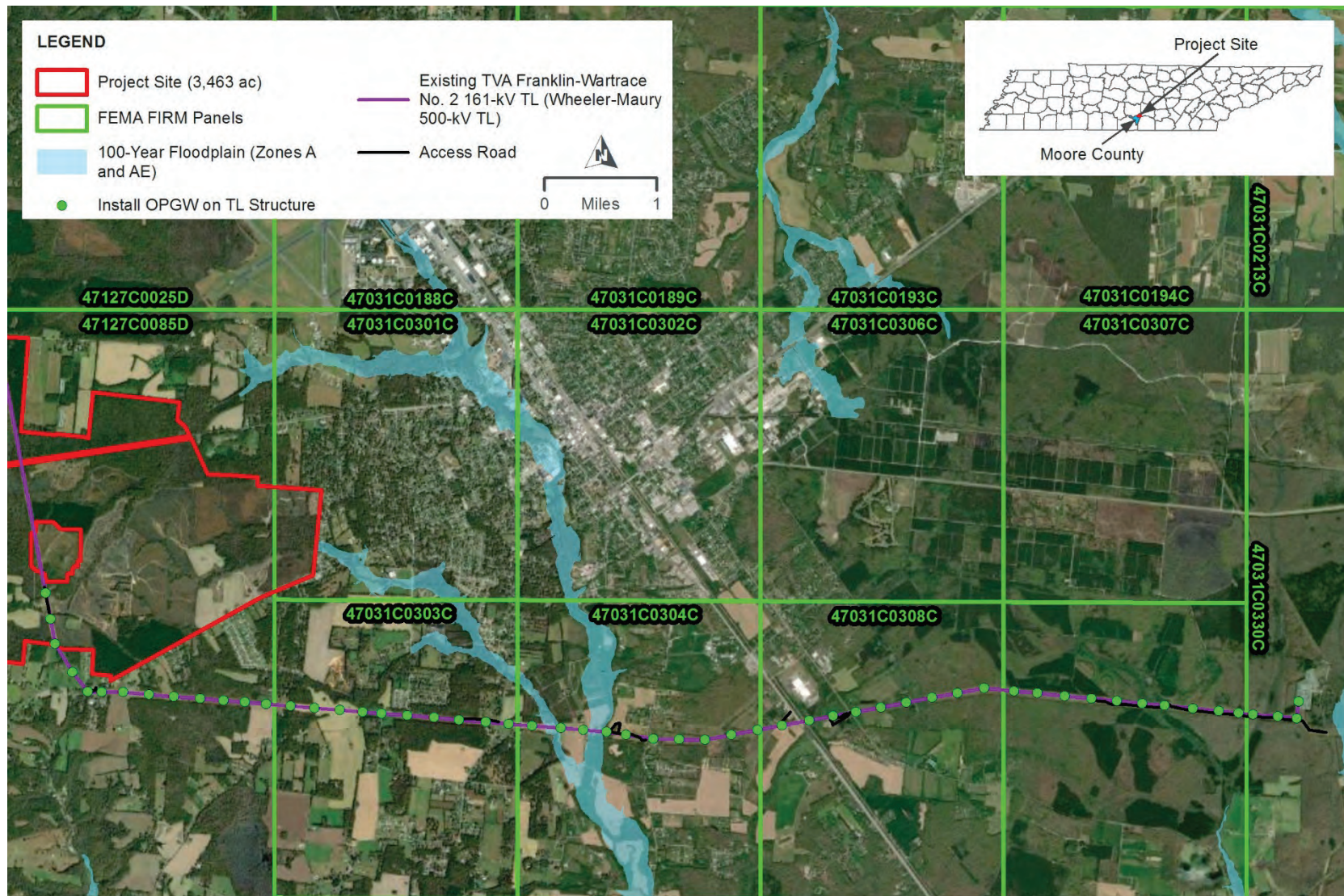


Figure 3-14. Floodplains in the TL upgrades vicinity

3.4.3.2 Environmental Consequences

3.4.3.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, existing impacts to floodplains associated with the existing land uses of forest management with timbering operations and agricultural uses would continue.

3.4.3.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. There will be no effects from the Proposed solar facility. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

The solar facility would consist of solar panels, a substation, a switchyard, access roads, an operations and maintenance building, fencing, laydown areas (which need to be shown on maps), stockpiles (of soil, I suppose), underground cables/wiring, AC collection cables, and one or more main power transformers. The OPGW would be installed on structures on an existing transmission line. Portions of the TL cross the floodplains of Turkey Creek, South Fork Blue Creek and its tributaries, North Fork Rock Creek, Poorhouse Creek and its tributaries, and Spring Creek and its tributaries. Gravel roads would be constructed, used as-is, or improved in order to access the structures. However, none of the access roads occur in floodplains. The OPGW would be installed near the tops of the structures, which is well above the 100-year flood elevation.

Based on Figures 3-8 and 3-9, the water quality survey discussed in Section 3.4.3.1.2, and the FIRMs shown in Figures 3-10 and 3-11, none of the proposed solar facility components would be located within mapped and unmapped 100-year floodplains. Therefore, the Project would be consistent with EO 11988.

3.4.3.2.2.1 Cumulative Impacts

Considering the activities and facilities described in Table 3-1, along with the Project, cumulative impacts to floodplains and their natural and beneficial values would be minimal because there are no regulated floodplains within the Project Site; the floodplains of the unmapped perennial streams within the Project Site would be avoided; and TL access roads will not result in more than a 1.0-ft rise in flood elevations in floodplains and will not create an obstruction within the published floodways of Rock Creek.

3.5 Biological Resources

The project area is located in the Interior Plateau Level III ecoregion, and the Project Site is more specifically within the Eastern Highland Rim Level IV ecoregion. In this region, Mississippian-age, calcareous geologies predominate, which results in karst features including springs, sinks, and caves (Griffith et al. 2001). The natural plant communities in this ecoregion are transitional between the oak-hickory forest that predominates to the west and the mixed mesophytic forest that predominates to the east. In the project area, the Eastern Highland Rim typically exhibits deep soils that support intensive row crop agriculture. The TL ROW consists mostly of grassland and herbaceous habitats with open pasturelands, forest edges, and early successional habitats.

Habitat assessments were conducted by HDR environmental scientists and presence/absence surveys were conducted by TVA biologists for listed plant and aquatic

species between April and July 2021 on the Project Site (HDR 2022; Appendix A). A bat habitat assessment was also conducted by Copperhead Environmental Consulting to assess and map potential bat habitat on the Project Site. Rare, threatened, and endangered species with the potential to occur on the Project Site were inventoried using desktop review in April 2021, and the presence of suitable habitat on the Project Site was determined using field findings. Field survey of the TL upgrade locations, including presence/absence surveys for listed plant species, occurred in early 2022. Results of the background research and various field investigations are described in this section.

3.5.1 Vegetation

3.5.1.1 Affected Environment

Field surveys focused on documenting natural plant communities, invasive plants, and the presence of threatened and endangered plant species on portions of the Project Site that would be disturbed by the Project. Using the National Vegetation Classification System (Grossman et al. 1998), vegetation types observed during field surveys consist of deciduous forest, evergreen forest, mixed evergreen-deciduous forest, and herbaceous vegetation. Two forest types are present; one of these, the Southeastern and South-Central Oak-Pine Forest and Woodland (M016) is represented by seven large areas comprising about 40 percent of the Project Site. The other forest type, Southeastern North American Ruderal Forest, encompasses 21.8 percent of the Project Site. In total, forested areas comprise approximately 61.5 percent (2,135 acres) of the Project Site, with the majority of large contiguous stands located in the northern and western sections of the Project Site. Other small, forested areas are located along streams and along field margins. While not a Grossman et al. category, the category “clear cut” was used to define areas where the current landowner is logging or has recently been logged in the Project Site. These total approximately 11.5 percent (397 acres) on the Project Site. Grassland/meadow and shrubland comprise approximately 15.6 percent (542 acres), while row and close grain crop areas, planted in corn and soybeans during the field survey, are present on approximately 5.8 percent (202 acres) of the Project Site.

Many of the flat areas (approximately 130 acres) supporting wet deciduous forest fit the concept of the globally rare plant community Willow Oak - White Oak / Black Highbush Blueberry - (Possumhaw) / Barratt's Sedge Wet Forest community (NatureServe 2021). This rare forest type is only found in the Eastern Highland Rim of Tennessee in the vicinity of Tullahoma. These areas possess regional conservation significance. The unique structure and composition of this forest type is directly related to the Taft clay loams soils, which produce a perched water table due to being somewhat poorly drained soils (also see Section 3.3.1.3). This results in very wet conditions throughout the winter, spring, and early summer, often followed by significant drying in late summer and fall. One atypical aspect of this forest type is the co-occurrence of white oak, which is typically an upland species, with deep sphagnum moss, which requires constant moisture. In the most pronounced examples of this community, areas dominated by willow oak and white oak often have a broken forest canopy resulting in a savanna-like appearance.

Natural ponds dominated by herbaceous vegetation occur within the northern portion of the Project Site. Water stands in these depressions during much of the year but may dry out in late summer or fall. Common herbaceous species include bushy bluestem, button sedge, coastal plain panicgrass, combleaf mermaidweed, horned beaksedge, lesser creeping rush, and wool grass. The state-listed species iris leaved yellow-eyed grass and Tennessee feather bells occur in and adjacent to this habitat.

The TL upgrade locations consist of maintained TVA ROW and no forested areas directly within these locations. Dominant species within the ROW include grass species, foxtail, soft rush, bushy bluestem, field garlic, velvet panic grass, tall goldenrod, black raspberry, and sedge species. The state-endangered plant Tennessee feather bells were also identified during TL ROW vegetation surveys along the ROW edges in partial sun, where forested areas abut the ROW. The state-listed species, slender blue flag, was observed growing both in full shade on the Project Site and within a grassland along the TL ROW in full sun.

Invasive plants, which are a major threat to native plant communities, have affected much of the Project Site. EO 13112, Invasive Species, directs TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems and take other related actions. The more recent EO 13751, Invasive Species, amended EO 13112 and directs federal agencies to continue coordinated federal prevention and control efforts related to invasive species. This order incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species and strengthens coordinated, cost-efficient federal action.

Within the Project Site, invasive species occur in nearly all habitats. This high level of invasive species infestation indicates that much of the Project Site has been repeatedly and heavily disturbed by human land uses, such as forest management with timbering operations and agricultural practices. All invasive plant species observed within the Project Site are common and widespread throughout Tennessee (Table 3-8).

Table 3-8. Invasive Plant Species, as Determined by the Tennessee Invasive Plant Council, Observed During Field Surveys of the Project Site

Common Name	Scientific Name
Japanese stiltgrass	<i>Microstegium vimineum</i>
Johnsongrass	<i>Sorghum halepense</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Chinese privet	<i>Ligustrum sinense</i>
Multifloral rose	<i>Rosa multiflora</i>

3.5.1.2 Environmental Consequences

3.5.1.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur.

3.5.1.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Adoption of this alternative would require clearing of approximately 780 acres of forest and the long-term maintenance of the area as grassland to prevent shading of the solar arrays.

Vegetation would also be removed for the construction of the proposed Project substation, switching station, and associated access roads. TL upgrades are not anticipated to require tree clearing but may require limited limb trimming along existing access roads. Much of the forest on the Project Site has been heavily degraded by current and previous land use and supports populations of invasive plants. Approximately 2,135 acres (62 percent) of the 3,463-acre Project Site are forested, while approximately 542 acres (16 percent) consist of a mix of grassland and shrubs, approximately 397 acres (12 percent) are recently timbered, and approximately 202 acres (6 percent) are agricultural fields, pastures, or otherwise cleared, open land. Taking into consideration the large amount of similar vegetation types in the area regionally (156,000 acres across Moore, Coffee, and Franklin counties), clearing the existing vegetation, including 780 acres of existing forest on the Project Site, and light grading would be considered moderate impacts. The loss of 780 acres of forested land would amount to approximately 0.5 percent of overall forested land across the three counties.

The approximately 130-acre rare plant community, the Willow Oak - White Oak / Black Highbush Blueberry (Possumhaw) / Barratt's Sedge Wet Forest community, would be avoided by the Project. As an enhancement measure, TVA and SR Tullahoma would develop a conservation plan that complements SR Tullahoma's regenerative agricultural model that would have the dual beneficial effect of protecting and restoring globally rare plant communities and rare plant populations that occur on site.

Apart from the rare plant areas, most herbaceous and herbaceous/shrub plant communities found on the Project Site are heavily disturbed, early successional habitats. Project-related construction would negatively impact these herbaceous plant communities by removal of sprouts, seedlings, and tree stumps resulting in increased impacts. However, disturbed areas would be re-seeded following construction to prevent erosion. While low growing vegetation would be planted under the PV arrays, construction of access roads and other Project infrastructure would result in some minor loss of herbaceous habitat for the life of the Project.

Sheep grazing would be used to maintain low-growing vegetation on most of the fenced solar facility. The sheep would graze the perennial and annual, non-invasive grass and herbaceous vegetation and be moved between fenced paddocks to maintain appropriate vegetation height and maximize plant and animal diversity. Creation of pollinator and potentially ground-nesting bird habitat would be encouraged by allowing seed heads to reach maturity wherever possible. Reseeding would remove invasives. The sheep would disperse perennial and annual, non-invasive seeds, both on their coats and through their manure, and their movement around the site would establish new plant growth and greater diversity in species composition. This would eliminate much of the need for mowing and selective herbicide application to manage vegetation growth, although these techniques would still be used as necessary. Routine management of vegetation within non-agricultural portions of the TL upgrade areas would be conducted under an integrated vegetation management approach designed to encourage the low-growing plant species and exclude tall-growing plants.

Many portions of the Project Site currently have a substantial component of invasive terrestrial plants, and adoption of the Proposed Action Alternative would not significantly affect the extent or abundance of these species at the county, regional, or state level. Construction of the Project would likely result in localized increases of invasive plants, but the plants most likely to colonize the area are distributed widely throughout the region.

Effects would be reduced because revegetation of the site would be accomplished using perennial and annual, non-invasive species. The Project, including the proposed sheep operations, would not significantly contribute to the spread of exotic or invasive species. The use of the TVA standard operating procedure of vegetating with non-invasive species (TVA 2017a) would serve to minimize the potential introduction and spread of invasive species on the Project Site.

3.5.1.2.3 Cumulative Impacts

Past, present, and RFFAs within the affected watersheds are either underway or planned and would affect many acres of agricultural land and several hundred acres of forested land. These developments consist of road improvement projects, manufacturing complexes, and industrial expansion. Similar to the Project, these developments would also remove vegetation from large tracts. However, the impacts of the Project would not result in significant cumulative impacts to vegetation due to the relatively small area of forest to be removed (780 acres) relative to the amount of forested area within the county (156,000 acres). Maintenance of the Project Site as perennial meadow would encourage pollinator and ground-nesting bird habitat and help offset the negative effects of the Project, as would other mitigation measures listed in Section 2.5.

3.5.2 Wildlife

3.5.2.1 *Affected Environment*

The Project Site is predominantly a mixture of forested areas, timber stands, and some agricultural fields. Rural-residential properties are present in scattered locations surrounding the Project Site. Forest types range from loblolly pine plantations to mixed-deciduous to deciduous. Forested wetlands and streams occur on the property. The TL ROW consists mostly of grassland and herbaceous habitats with open pasturelands, forest edges, and early successional habitats. Overall, wildlife habitats present on the Project Site and in the project area are common to the region and are not unique.

Forests and croplands comprise the vast majority of the Project Site. Actively cultivated fields provide habitat for a limited number of common wildlife species. Fields left fallow provide habitat for a wider range of species. Common inhabitants of croplands include killdeer, brown-headed cowbird, eastern bluebird, eastern kingbird, eastern meadowlark, field sparrow, grasshopper sparrow, and red-tailed hawk. (National Geographic 2002). Bobcat, coyote, eastern cottontail, hispid cotton rat, and red fox are mammals typical of fields and cultivated land (Whitaker 1996). Amphibians such as eastern narrow-mouthed toad and reptiles including black racer, ring-necked snake, and eastern black kingsnake are also known to occur in this habitat type (Powell et al. 2016; Bailey et al. 2006; Gibbons and Dorcas 2005).

Existing ROWs requiring TL upgrades are comprised of a variety of herbaceous habitats ranging from croplands to pasturelands and early successional habitats. Birds that utilize these areas include chipping sparrow, field sparrow, house finch, killdeer, grasshopper sparrow, mourning dove, red-tailed hawk, red-winged blackbird, wild turkey, and white-throated sparrow (National Geographic 2002). Mammals that can be found in these areas are common mole, coyote, least shrew, white-footed mouse, and white-tailed deer (Whitaker 1996). Reptiles that may use these habitats in this region include black racer, gray rat snake, eastern black kingsnake, and scarlet kingsnake (Gibbons and Dorcas 2005). Emergent wetlands and saturated ephemeral streams within field settings provide habitat for common amphibians. Amphibians likely present include American bullfrog,

American toad, southern leopard frog, spring peeper, as well as upland chorus frog (Powell et al. 2016).

Developed and disturbed areas are home to a large number of common species, including American robin, American crow, Carolina chickadee, European starling, house finch, house sparrow, mourning dove, Carolina wren, northern cardinal, northern mockingbird, black vulture, and turkey vulture (National Geographic 2002). Mammals found in this community type include eastern gray squirrel, striped skunk, and raccoon (Whitaker 1996). Road-side ditches provide potential habitat for amphibians including American toad and upland chorus frog. Reptiles potentially present include red-bellied snake, gray rat snake, and smooth earth snake (Powell et al. 2016; Gibbons and Dorcas 2005).

Young forest regrowth in recently harvested forested areas provide habitat for common birds, mammals, amphibians, and reptiles, as well as many insect pollinator species. Birds observed on the Project Site within these habitats consisted of black vulture, blue grosbeak, cliff swallow, eastern bluebird, indigo bunting, and northern mockingbird. Mammals that would use this area include bobcat, common raccoon, coyote, eastern chipmunk, eastern mole, groundhog, nine-banded armadillo, white-footed deer mouse, and white-tailed deer (Whitaker 1996). Eastern kingsnake and southern black racer are reptiles that may be found here (Gibbons and Dorcas 2005).

Review of the TVA Regional Natural Heritage Database (RNHD) in April 2021, June 2021, and March 2022, indicated that six records of caves exist within three miles of the Project Site or TL upgrade locations. The closest of these is approximately 0.3 mile away. In addition, a colonial wading bird colony was identified as occurring approximately two miles from the Project in Franklin and Maury counties.

3.5.2.1.1 Migratory Birds

EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to conserve migratory birds and implement the Migratory Bird Treaty Act (MBTA). The MBTA prohibits the “take” of migratory birds. The regulatory definition of “take” as defined by 50 CFR § 10.12, “means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue hunt, shoot, wound, kill, trap, capture, or collect.” The following prohibitions apply to migratory bird nests: “possession, sale, purchase, barter, transport, import and export, take, and collect.” The MBTA is executed and enforced by USFWS. SR Tullahoma and its contractors would act in compliance with the MBTA. Approximately 147 species of migratory birds have been identified in Moore County (eBird 2021), and additional species likely occur regularly. The USFWS maintains a list of migratory birds of conservation concern (USFWS 2021). These species are not listed under the ESA but are a high conservation priority of the USFWS. Twenty-three species of birds of conservation concern are listed for Bird Conservation Region 24, Central Hardwoods, which contains the Project Site. Of these 23 species, at least 11 likely occur with some regularity on or in the immediate vicinity of the Project Site (Table 3-9).

Both bald and golden eagles are protected by the MBTA and the Bald and Golden Eagle Protection Act of 1940 (BGEPA, 16 U.S.C. 668-668d). The suitability of the Project site as habitat for the bald eagle is not likely due to the absence of large water bodies. The golden eagle may utilize the Project site during the winter; see the Wildlife and Vegetation Assessment in Appendix A.

Table 3-9. Migratory Bird Species of Conservation Concern Potentially Occurring within the Project Site and/or TL

Scientific Name	Common name	Season of Occurrence	Likelihood of Presence/Habitat
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	Spring through fall	Likely , deciduous and mixed forests with open understory and forest edges; reported from vicinity
<i>Chaetura pelagica</i>	Chimney Swift	Spring through fall	Likely , nests in chimneys and less frequently large, open-topped hollow trees; reported from vicinity and likely forages over Project Site
<i>Tringa flavipes</i>	Lesser Yellowlegs	Spring and fall	Possible , occurs in extensive emergent wetlands and seasonally flooded agricultural fields with sparse, low vegetation
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Year-round	Likely ; inhabits open forests and pine savannahs, reported from vicinity
<i>Hylocichla mustelina</i>	Wood Thrush	Spring through fall	Likely , deciduous and mixed forests with shrubs in understory; reported from vicinity
<i>Spizella pusilla</i>	Field Sparrow	Year-round	Likely , grasslands with scattered shrubs and saplings, recently clear-cut areas; reported from vicinity
<i>Euphagus carolinus</i>	Rusty Blackbird	Winter	Likely , forested wetlands
<i>Protonotaria citrea</i>	Prothonotary Warbler	Spring through fall	Possible , forested wetlands with areas of standing water
<i>Geothlypis formosa</i>	Kentucky Warbler	Spring through fall	Likely , moist deciduous forest with shrubby understory
<i>Setophaga cerulea</i>	Cerulean Warbler	Spring through fall	Possible , mature deciduous forest with scattered canopy gaps
<i>Setophaga discolor</i>	Prairie Warbler	Spring through fall	Likely , brushy fields and recently harvested, regenerating woodlands

3.5.2.2 Environmental Consequences

3.5.2.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to common wildlife would occur if current land use practices continued.

3.5.2.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Facility construction and maintenance would alter wildlife habitats and affect the wildlife occurring in these habitats. Approximately 780 acres of forest would be cleared. This would reduce the amount of suitable habitat for wildlife occurring in these areas, resulting in the likely decline of the local populations of many species. Some more mobile wildlife would disperse into surrounding areas, although their survival in these areas may be low due to

competition with other members of their species. Other less mobile individuals would be directly eliminated by construction activities, particularly during breeding and hibernation seasons or periods of dormancy. Large sections of forested habitat would be removed across the site for construction and operation of the solar facility. The removal of large sections of forested habitat would directly impact wildlife species utilizing this habitat through temporary to long-term displacement. However, large amounts of forested habitat are available regionally (156,000 acres across in Moore, Coffee, and Franklin counties); the loss of 0.5 percent of that overall acreage due to the Project would be considered moderate.

Migratory birds of conservation concern that would likely be adversely affected include the red-headed woodpecker, prairie warbler, blue-winged warbler, eastern whip-poor-will, Kentucky warbler, rusty blackbird, and wood thrush. Habitat for these species would be removed from the Project Site. The local populations of these species, as well as other wildlife occupying forest and shrub habitats but not considered of conservation concern, would be adversely affected. Areas of the TL ROWs that are not maintained as grassland or cropland provide habitat for the prairie warbler.

Although construction and operation of the Project may reduce the foraging potential on the Project site and in the TL upgrade areas, the Project is not anticipated to have an effect on populations of migratory birds that require open country with scattered trees and shrubs, such as the prairie warbler. Similar habitat is available adjacent to the Project site and would likely absorb displaced individuals.

Overall, while the implementation of the Project would have adverse effects on some migratory bird species, particularly those occupying woodlands, the effect would be localized and minor.

Bald eagles are unlikely to nest or forage on the Project site due its distance from large waterbodies. In addition, no bald eagle nests have been documented within three miles of the Project site. Therefore, the Project would have no impact on bald eagles. Due to the rarity of golden eagles in the region and the availability of suitable roosting and foraging in nearby similar habitat, the Project is not expected to impact golden eagles.

The establishment and maintenance of sheep pasture under and around the PV arrays would benefit many small mammals and other wildlife occupying grasslands. The degree to which this would benefit grassland birds, several of which are of conservation concern and/or have declining populations in the region, is not well understood as the presence of the PV arrays may reduce the suitability of the area.

Bees, moths, butterflies, and many other insects are critical components of ecosystems and crop production due to their roles as pollinators. Sheep grazing would be used to maintain low-growing vegetation within most of the fenced solar facility. The sheep would graze the perennial and annual, non-invasive grass and herbaceous vegetation and be moved between fenced paddocks to maintain appropriate vegetation height and maximize plant and animal diversity. Creation of pollinator habitat would be encouraged by allowing seed heads to reach maturity wherever possible. Ground-nesting habitat for birds may also be encouraged given these conditions. A field-based study of the effects of solar facilities on local biodiversity showed more bird diversity in solar facilities versus control areas, suggesting that ground-nesting conditions within the solar arrays would be favorable (Montag et al. 2016). The sheep would disperse seeds, both on their coats and through

their manure, and their movement around the site would establish new plant growth and greater diversity in species composition. This would eliminate much of the need for mowing and selective herbicide application to manage vegetation growth, although these techniques would still be used as necessary.

3.5.2.2.3 Cumulative Impacts

Past, present, and RFFAs are either underway or planned and would affect many acres of agricultural land and several hundred acres of forested land. These developments consist of road improvement projects, manufacturing complexes, and industrial expansion. Similar to the Project, these developments would also be subject to wildlife resource protection measures, including applicable federal and state laws such as those that mitigate animal disturbance, collection, or removal, and avoid unnecessary disturbance to riparian buffer areas. With implementation of these measures, the Project is not anticipated to contribute to significant cumulative effects to wildlife in the Project area.

3.5.3 Aquatic Life

3.5.3.1 Affected Environment

3.5.3.1.1 Aquatic Ecology

Field surveys were completed in June and July 2021. A total of 30 perennial or intermittent streams, seven ponds, and 36 ephemeral streams were delineated on the Project Site. The streams encountered on the Project Site were typical of the Eastern Highland Rim Level IV ecoregion. An additional five perennial streams and five ephemeral streams were identified within the TL upgrade locations during field surveys in early 2022. Streams and other water bodies on the Project Site are described in more detail in Section 3.4.2.

Species sampling was conducted in Hurricane Creek, Rock Creek, and their associated tributaries located within the Project Site in 2021. Results for each sample location are presented in Table 3-10. Most of the collected species were common; however, one previously undescribed species of burrowing crayfish (*Cambarus* sp.) was collected in the Hurricane Creek drainage within the Project Site. *Cambarus* sp. is only known from the Project Site and portions of the Hurricane Creek drainage immediately south of the Project Site. The uncommon, state-listed flame chub was also detected. The flame chub is rare due to its spring-influenced habitat, and the populations discovered on the Project Site are important for the long-term conservation of the species in Tennessee.

Table 3-10. Aquatic Species Identified within the Project Site

Common Name	Scientific Name	Site Where Species Was Encountered ¹
Fish		
Largescale stoneroller	<i>Campostoma oligolepis</i>	1, 9
Rosyside dace	<i>Clinostomus funduloides</i>	1
Creek chub	<i>Semotilus atromaculatus</i>	1, 5, 7, and 9
Green sunfish	<i>Lepomis cyanellus</i>	1, 7, and 9
Bluegill	<i>Lepomis macrochirus</i>	1 and 9
Western blacknose dace	<i>Rhinichthys obtusus</i>	1
Southern redbelly dace	<i>Chrosomus erythrogaster</i>	1, 7
Black darter	<i>Etheostoma duryi</i>	1, 5
Blackfin darter	<i>Etheostoma nigripinne</i>	1, 5
Western mosquitofish	<i>Gambusia affinis</i>	1, 5
Fantail darter	<i>Etheostoma flabellare</i>	2

Common Name	Scientific Name	Site Where Species Was Encountered ¹
Banded sculpin	<i>Cottus carolinae</i>	2
Flame chub	<i>Hemitremia flammea</i>	5 and 9 and in Stream 3 within the TL line area
Creek chubsucker	<i>Erimyzon oblongus</i>	5
Mimic shiner	<i>Notropis volucellus</i>	9
Golden shiner	<i>Notemigonus crysoleucas</i>	9
White sucker	<i>Catostomus commersoni</i>	9
Crayfish		
Two-spot crayfish	<i>Cambarus graysoni</i>	1, 5, and 7
Tanback crayfish	<i>Cambarus giardianus</i>	1 and 2
Cave spring crayfish	<i>Cambarus tenebrosus</i>	1
Undescribed species	<i>Cambarus</i> sp.	1
Wonderful crayfish	<i>Faxonius mirus</i>	1, 2, 5, and 7
Ambiguous crayfish	<i>Cambarus striatus</i>	5 and 9

¹ Site 1: Hurricane Creek, off of Cumberland Springs Rd., upstream of old impoundment

Site 2: Hurricane Creek, downstream of impoundment

Site 5: West Fork Rock Creek, alongside SR 55, just upstream of the Coffee County line

Site 7: Hurricane Creek, downstream of SR 55 crossing

Site 9: North Fork Blue Creek, private land adjacent to Cumberland Springs Road, just west of Tullahoma Stream 3 on TL: Spring Creek within the Arnold Air Force Base (AFB)

3.5.3.2 Environmental Consequences

3.5.3.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to aquatic life would occur if current land use practices continued.

3.5.3.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL. This may result in direct or indirect impacts to aquatic species present on the Project Site and in the TL upgrade locations.

The locations of sensitive aquatic species within the Project Site were carefully considered when designing the solar facility. With the current layout, no arrays would be placed within areas known to support rare aquatic species or their habitats and implementation of the Action Alternative would result in no direct impacts to those populations. Given the existence of these rare aquatic species on the Project Site, outside of the solar facility footprint, and as an environmental enhancement measure, TVA would work together with SR Tullahoma to develop a conservation plan that complements SR Tullahoma's regenerative agricultural model. The plan would have the dual beneficial effects of protecting and restoring globally rare aquatic communities and populations that occur on site.

Potential impacts to aquatic species from the Project may result from herbicide runoff into streams. Indirect impacts to aquatic species may also occur due to minor increases in erosion and sedimentation during construction and operations. Siltation has a detrimental effect on many aquatic animals adapted to stream environments. Turbidity caused by

suspended sediment can negatively impact spawning and feeding success of fish and mussel species (Brim Box and Mossa 1999; Sutherland et al. 2002). Streamside management zones, or vegetative buffers, would be left intact on the Project Site. Thus, the changes would occur due to minor increases in erosion and sedimentation during construction and operations. These Project effects would be temporary and minimized by adherence to soil management BMPs. Sheep grazing as a means of vegetation control would reduce the need for herbicide, and therefore would reduce the negative effects of herbicide runoff.

Ephemeral streams documented on the Project Site only flow in response to precipitation events and do not support aquatic life. Ground disturbances surrounding ephemeral streams, in the form of installing small-diameter PV array pilings and trenching for installation of electrical cables, would be relatively minimal, and BMPs would be implemented to prevent or reduce surface water runoff from carrying suspended solids into adjacent waterbodies (TVA 2017a).

Streams present near the TL structures or intersected by access roads associated with the TL upgrades have the potential to be impacted from surface water runoff increasing siltation to those receiving waters. Ground disturbance would be minimized, and all work would be conducted in accordance with BMPs outlined in TVA's BMP manual (TVA 2017a). Therefore, impacts to the aquatic ecology of streams in association with the TL upgrades would be minor and insignificant. Furthermore, applicable CWA Section 404 and 401 permits would be obtained from USACE and TDEC for any stream alterations located in the TL upgrade locations, and application of the terms and conditions of these permits would minimize potential resource impacts. The permits may also require compensatory mitigation.

3.5.3.2.3 Cumulative Impacts

This project and its associated direct and indirect impacts would likely gradually degrade existing streams and threatened and endangered aquatic species within the Project area over the next several decades. Negative Project impacts resulting from cumulative impacts may be lessened by the proposed mitigation measures

With implementation of these measures, the Project is not anticipated to contribute to significant cumulative effects to aquatic life in the Project area.

3.5.4 Threatened and Endangered Species

3.5.4.1 Affected Environment

Rare, threatened, and endangered species are regulated by both the federal and state governments. Lists from TVA's RNHD and USFWS's Information for Planning and Consultation (IPaC) of federally and state-listed species potentially occurring in the project area were obtained in April 2021 for the Project Site and in January and February 2022 for the TL upgrade locations (USFWS 2020). The RNHD identified species potentially occurring in Moore County or Coffee County and/or within resources-defined distances from the Project Site or TL upgrade locations or generally listed for the county. These lists were obtained to identify the rare, threatened, and endangered animal and plant species potentially occurring in the project area, and to focus field survey efforts on habitats potentially occupied by these species.

Table 3-11 provides a summary of the federally and state-listed species that were identified in reviews of the RNHD and IPaC. No designated critical habitat occurs within the Project

Site. Each federally and state-listed species is discussed in this section in relation to potential habitat on the Project Site.

Table 3-11. Federally and State-Listed or Protected Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Bird							
Bachman's Sparrow	<i>Peucaea aestivalis</i>	-	E	S1B	Franklin	Inhabits mature pine forest with an understory.	Yes
Common Barn Owl	<i>Tyto alba</i>	-	E	S3	Coffee	Inhabits grasslands, scrublands, groves, farms, fields, or towns.	Yes
Bald Eagle	<i>Haliaeetus leucocephalus</i>	DM	D	S3	Coffee	Seacoasts, rivers, large lakes, oceans, and other large bodies of open water with an abundance of fish.	Yes (TL structures)
Osprey	<i>Pandion haliaetus</i>	-	-	S3	Maury	Seashore, coastal marshes, lakes and rivers	Yes (TL structures)
Fish							
Ashy Darter	<i>Etheostoma cinereum</i>	-	E	S2S3	Bedford, Marshall, and Coffee	Inhabits medium to large streams with relatively shallow pools with languid currents and boulders as cover.	No
Barrens Topminnow	<i>Fundulus julisia</i>	LE	E	S1	Coffee	Inhabits springhead pools and slow flowing areas of springs.	Yes
Boulder Darter	<i>Etheostoma wapiti</i>	LE	E	S1		Inhabits small to medium rivers with deep fast-moving water over boulder and slab rock bottoms.	No
Coppercheek Darter	<i>Etheostoa aquali</i>	-	T	S2S3	Marshall, Bedford, Maury, Coffee, and Hickman	Inhabits small and medium sized rivers where it occurs in rocky riffles with clear, fast-flowing water.	No
Flame Chub	<i>Hemitremia flammea</i>	-	E	S3	Coffee, Franklin, Moore, Bedford, and Maury	Inhabits springs, shallow seepage waters, and spring-fed streams usually over gravel in areas where aquatic vegetation is abundant.	Yes; Known
Golden Darter	<i>Etheostoma denoncourtii</i>	-	D	S2	Marshall, Maury, and Bedford	Inhabits shallow gravel riffles in small to medium-sized rivers.	No
Longhead Darter	<i>Percina macrocephala</i>	-	T	S2	Coffee and Bedford	Inhabits moderate to large sized streams with swift deep currents and bottoms of cobble and boulders.	No
Pygmy Madtom	<i>Noturus stanauli</i>	LE	E	S1	Hickman	Inhabits clear medium sized rivers with pea sized gravel of fine sand substrates.	No

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Redband Darter	<i>Etheostoma luteovinctum</i>	-	D	S4	Marshall, Bedford, Maury, and Coffee	Inhabits shallow pools with rocky substrates and spring fed streams with limestone bedrock, rubble, gravel and silt substrates.	No
Saddled Madtom	<i>Noturus fasciatus</i>	-	T	S2	Marshall and Bedford,	Inhabits rocky riffles, runs and flowing pools of clear creeks and small rivers.	No
Slenderhead Darter	<i>Percina phoxocephala</i>	-	D	S3	Marshall, Maury, Bedford, and Hickman	Inhabits shallow waters with riffles and moderate currents in small to medium sized streams.	No
Southern Cavefish	<i>Typhlichthys subterraneus</i>	-	-	S3	Coffee	Inhabits caves near watertable and have low energy flows	No
Striated Darter	<i>Etheostoma striatulum</i>	-	T	S1	Maury, Bedford, Marshall, and Coffee	Inhabits rocky pools of headwaters and creeks.	No
Tennessee logperch	<i>Percina apina</i>	-	D	S2	Coffee	Restricted to the Western Highland Rim within swift runs of depths about 1 meter or less with predominant gravel and cobble substrates	No
Mammal							
Common Shrew	<i>Sorex cinereus</i>	-	-	S4	Franklin	Prefers rich, moist woodlands with plenty of moss and leaf litter	Yes
Gray Bat	<i>Myotis grisescens</i>	LE	T	S2	Coffee, Franklin, Bedford, Maury, and Moore	Roosts in caves or karst features year-round. Various foraging habitats including wet meadows, damp woods, and uplands. No suitable roosting habitat present on-site; use of site for foraging confirmed by mist net survey.	Yes; Known

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Indiana Bat ²	<i>Myotis sodalis</i>	LE	E	S2	Franklin, Bedford, and Maury	Spend winter hibernating in caves and mines, called hibernacula. Suitable summer migratory tree-roosting bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with potential roost trees (PRT). A PRT has exfoliating bark, cracks, crevices or cavities that are greater than or equal to 5-inch DBH. No Indiana bats were caught during the mist net survey.	Yes
Little Brown Bat	<i>Myotis lucifugus</i>	-	T	S3	Franklin and Coffee	Various habitats including wet meadows, damp woods, and uplands, including abandoned structures and sinkhole fissures/karst features; statewide. No little brown bats were caught during the mist net survey.	Yes
Northern Long-eared Bat ²	<i>Myotis septentrionalis</i>	LT	T	S2	Maury, Coffee, Franklin, and Bedford	Spend winter hibernating in caves and mines, called hibernacula. Suitable summer migratory tree-roosting bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with PRT. A PRT has exfoliating bark, cracks, crevices or cavities that are greater than or equal to 3-inch diameter at breast height (DBH). No NLEB were caught during the mist net survey.	Yes
Pygmy Shrew	<i>Sorex hoyi</i>	-	-	S2	Franklin	Inhabits grasslands, wetlands, woodlands and farmlands.	Yes
Southeastern Shrew	<i>Sorex longirostris</i>	-	-	S4	Franklin	Various habitats including fields, forests, cultivated fields, and abandoned fields	Yes

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Tri-colored Bat	<i>Perimyotis subflavus</i>	-	T	S2S3	Bedford	Various habitats including wet meadows, damp woods, and uplands, including abandoned structures and sinkhole fissures/karst features; statewide. No tri-colored bats were caught during the mist net survey.	Yes
Mollusk							
Birdwing Pearlymussel	<i>Lemiox rimosus</i>	LE	E	S1	Maury, Marshall, and Bedford	Only known to inhabit the Duck, Elk, Clinch, and Powell rivers.	No
Cracking Pearlymussel	<i>Hemistena lata</i>	-	E	S1	Maury	Inhabits riffles of small to medium sized streams.	No
Cumberland Pigtoe	<i>Pleurobema gibberum</i>	-	E	S1	Coffee	Inhabits stream riffle areas of gravel or sand.	No
Cumberland Monkeyface	<i>Quadrula intermedia</i>	-	E	S1	Maury and Marshall	Inhabits shallow fast flowing streams with substrates.	No
Cumberlandian Combshell	<i>Epioblasma brevidens</i>	-	T	S1	Marshall and Maury	Inhabits medium-sized streams to large rivers with shoals and riffles in coarse sand, gravel, cobble, and boulders.	No
Fine-rayed Pigtoe	<i>Fusconaia cuneolus</i>	-	E	S1	Franklin	Inhabits sand and gravel shoals of streams and rivers	No
Fluted Kidneyshell	<i>Ptychobranhus subtentum</i>	LE	E	S2S3	Marshall, Franklin, and Bedford	Only known to inhabit the Tennessee River.	No
Littlewing Pearlymussel	<i>Pegias fabula</i>	LE	E	S1	Franklin	Inhabits small to medium sized rivers in areas with a swift current.	No
Orange-foot Pimpleback	<i>Plethobasus cooperianus</i>	-	E	S1	Maury and Marshall	Inhabits deep fast flowing rivers with sand or gravel substrate.	No
Ornate Rocksnail	<i>Lithasia geniculata</i>	-	-	S2	Bedford, Maury, and Marshall	Inhabits shallow fast flowing streams with substrates.	No
Painted Snake Coiled Forest Snail	<i>Anguispira picta</i>	-	T	S1	Franklin	Inhabits damp limestone outcrops.	No
Pale Lilliput (pearlymussel)	<i>Toxolasma cylindrellus</i>	LE	E	S1	Coffee, Marshall, Maury, and Franklin	Inhabits small to moderate sized streams in areas of slow to moderate current, usually in less than three feet of water.	No
Pink Mucket	<i>Lampsilis abrupta</i>	-	E	S2	Marshall	Inhabits shallow riffles and shoals of major rivers and tributaries.	No

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	LT	E	S2	Maury and Marshall	Typically inhabiting small to medium sized rivers with moderate to swift currents.	No
Rayed Bean	<i>Villosa fabalis</i>	-	E	S1	Marshall	Inhabits small shallow rivers in and near riffles. Often near aquatic vegetation.	No
Round Hickorynut	<i>Obovaria subrotunda</i>	LE	E	S2S3	Marshall, Bedford, and Marshall	Inhabits medium to large sized rivers with sand and gravel substrates.	No
Sheepnose	<i>Plethobasus cyphus</i>	-	E	S2S3	Maury	Inhabits shallow areas with moderate to swift currents flowing over sand and gravel.	No
Shiny Pigtoe	<i>Fusconaia cor</i>	LE	E	S1	Franklin	Inhabits relatively silt-free substrates of sand, gravel, and cobble in good flows of smaller streams.	No
Slabside Pearlymussel	<i>Pleuroaia dolabellodes</i>	LE	E	S2	Maury, Marshall, Bedford, Moore and Franklin	Found primarily in large creek to moderately sized rivers. Generally observed in gravel substrates within interstitial sand, with moderate current.	No
Snuffbox	<i>Epioblasma triquetra</i>	-	E	S3	Marshall	Riffles or shoals of rocky rivers and the shores of lakes with wave activity	No
Tan Riffleshell	<i>Epioblasma florentina walker</i>	LE	E	S1	Marshall, Franklin, Maury, and Bedford	Inhabits relatively silt-free substrates of sand, gravel, and cobble in good flows of smaller streams.	No
Turgid Blossom (pearlymussel)	<i>Epioblasma turgidula</i>	LE	E	S1	Maury, Bedford, and Coffee	Inhabits medium rivers with clear, unpolluted water typically found buried in sand and gravel.	No
Winged Mapleleaf	<i>Quadrula fragosa</i>	-	E	S1		Inhabits riffles or shallow areas of freshwater rivers that have substrates composed of gravel, sand and mud.	No
Plants							
American Ginseng	<i>Panax quinquefolis</i>	-	C	S3S4	Moore	Inhabits rich, cool, moist, possibly older growth, deciduous forest.	Yes
Barratt's Sedge	<i>Carex barrattii</i>	-	E	S2	Coffee	Peaty swamps, pinelands, and wet woods.	Yes, Known
Beakrush	<i>Rhynchospa perplexa</i>	-	T	S2	Coffee and Franklin	Inhabits dried out swamps and oak barrens.	Yes

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Black Footed Quillwort	<i>Isoetes melanopoda</i>	-	E		Moore	Shallow, temporarily flooded, flat-bottomed pools formed by natural erosion on granite outcrops.	Yes; Known
Button Sedge	<i>Carex bullata</i>	-	C	S3	Moore	Bogs, fens, meadows and fields, ponds, shores of rivers and lakes.	Yes; Known
Dwarf Huckleberry	<i>Gaylussacia dumosa</i>	-	T	S3	Coffee and Franklin	Inhabits pine savannas, flatwoods, sandhills and scrub habitats.	Yes
Dwarf Sundew	<i>Drosera brevifolia</i>	-	E	S2	Coffee, Moore, and Franklin	Sandy, acidic soils and requires open ground to germinate. Found in disturbed areas devoid of vegetation.	Yes; Known
Eggert's Sunflower	<i>Helianthus eggertii</i>	-	C	S3	Franklin, Coffee, and Maury	Inhabits Rocky hills and barrens and roadside remnants of forested oak habitats.	Yes
Iris Leaved Yellow-eyed Grass	<i>Xyris laxifolia</i> var. <i>iridifolia</i>	-	E	S2	Moore	Areas that are inundated much of the year, but not within deeper pools.	Yes; Known
Low Frostweed	<i>Helianthem propinquum</i>	-	E	S1S2	Coffee	Inhabits dry sandy slopes.	Yes
Narrowleaf Bushclover	<i>Lespedeza angustifolia</i>	-	T	S2	Coffee	Inhabits sandhills, pine flatwoods, and old field pinelands, as well as dry pond margins and open flood plains on areas that are mesic to excessively well drained.	Yes
Ovate Catchfly	<i>Silene ovata</i>	-	E	S2	Coffee	Inhabits dry - mesic forest, mountain summits.	No
Panic-grass	<i>Dichantherim ensifolium</i> ssp. <i>curtifolium</i>	-	E	S1	Moore, Coffee, and Franklin	Inhabits sandy loam of moist areas in oak barrens.	Yes
Rough Rattlesnakeroot	<i>Prenanthes aspera</i>	-	E	S1	Moore	Dry prairies and barrens, limestone glades, dry, open rocky woods.	No
Roughish Witchgrass	<i>Dichantherim acuminatum</i> ssp. <i>leucothrix</i>	-	C	-		Inhabits moist pine barrens.	
Sand Cherry	<i>Prunus pumila</i>	-	E	S1	Franklin and Bedford	Sand cherry typically grows on sandy, gravelly, and rocky soils, dunes, beaches, and outwash plains. Sites are typically dry and excessively drained.	

Common Name	Scientific Name	Federal Status	State Status	State Rank	County Occurrence	Preferred Habitat	Potential Habitat on Project Site/ TL Upgrade Locations
Shortleaf Beardgrass	<i>Gymnopogon brevifolius</i>	-	C	S1S2	Coffee	In habits pine savannas, sandhills, dry woodlands; sandy or peaty ground, pine barrens on the coastal plain.	Yes
Slender Blue Flag	<i>Iris prismatica</i>	-	T	S2S3	Coffee	Disturbed habitats such as burned or scraped old fields, ditches, and roadside swales. Marshes, swamps, and damp meadows.	Yes; Known
Tennessee Feather Bells	<i>Stenanthium tennesseense</i>	-	T	S2	Moore	Grassland remnants of the Eastern Highland Rim and Cumberland Plateau in Tennessee.	Yes; Known
Virginia Chain Fern	<i>Woodwardia virginica</i>	-	C	-	Moore	Acidic wetlands, mostly in the eastern part of Tennessee.	Yes; Known
Wolf Spikerush	<i>Eleocharis wolfii</i>	-	E	S1	Coffee and Marshall	Inhabits margins of shallow pools on level bedrock outcrops or on the margins of creeks and wetlands.	Yes
Yellow Fringeless Orchid	<i>Platanthera integra</i>	-	E	S1	Moore	Inhabits bogs in the Mountains and Piedmont.	Yes
Yellow Crested Orchid	<i>Platanthera cristata</i>	-	C	-	Coffee	Inhabits acidic seeps and stream heads.	Yes
Reptiles							
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>	-	D	S3	Franklin	Inhabits dry grasslands and forests.	Yes
Northern Pine Snake	<i>Pituophis melanoleucus melanoleucus</i>	-	T	S3	Franklin	Inhabits well drained sandy soils in pine or mixed pine/hardwood forest.	Yes

² Species reported for county and not the immediate project area.

Federal status codes: LE = Listed Endangered; LT = Listed Threatened; PS = Partial Status

State status codes: C = Species of concern; D = Deemed in Need of Management; E = Endangered; S1 = Critically imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Rank of breeding population; T = Threatened

State ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

3.5.4.1.1 Federally Listed Species

3.5.4.1.1.1 Terrestrial Animals

Review of the RNHD and IPaC indicated that the gray bat and northern long-eared bat have been reported within three miles of the Project Site or the TL upgrade locations. Three federally listed terrestrial animal species (gray bat, Indiana bat, and northern long-eared bat) have been reported within Moore, Franklin, Maury, Marshall, Coffee, and Bedford counties (Table 3-11). The gray bat was documented on site during mist net surveys.

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This species is associated with larger mature trees capable of supporting its massive nests. These are usually found near larger waterways where the eagles forage (USFWS 2007). Bald eagles are known to nest in Tennessee, with 175 nesting pairs as of 2012 (TWRA 2021). While suitable nesting trees occur throughout the Project Site, there is no large water body close enough for this to be considered a likely nesting site. Bald eagles have the potential to nest on TL pole structures in the TL upgrade locations. No bald eagle nests were documented on the Project Site during the field reviews.

No known caves or suitable winter roosting structures for the gray bat, Indiana bat, and northern long-eared bat exist on the Project Site or in the TL upgrade locations. Five caves occur within three miles of the Project Site and TL upgrade locations, with the closest within 1.5 miles. One of these caves was reported by Arnold AFB personnel to be a gray bat maternity site. Field surveys were conducted on the Project Site in May 2021, following the Range-Wide Indiana Bat Survey Guidelines (USFWS 2020), to determine the suitability of forests as summer roosting habitat for the Indiana and northern long-eared bats. The habitat survey identified 1,983 acres of summer roosting habitat occurring on the Project Site in mature live hardwoods (including white oaks and shagbark hickories) and snags. Approximately 5.5 percent (109 acres) of the 1,983 acres was assessed as high-quality habitat, 65.6 percent (1,301 acres) as moderate-quality habitat, and 28.9 percent (573 acres) as low-quality habitat. Buildings on the Project Site were also evaluated for their potential as suitable habitat for these two federally listed bat species. One building, a small shed, and a culvert had low potential for bat habitat, as these did not provide large areas of cover from the surrounding environment, nor were signs of bat use noted. Based on an early 2022 survey of the TL upgrade locations, no suitable summer roosting habitat exists along access roads or in the TL ROW. Mist net surveys were conducted on the Project Site in May 2021 following federal guidance to determine the presence or absence of the Indiana and northern long-eared bats (Copperhead 2021). Neither of these species was captured during mist net surveys; however, three gray bats were captured, likely due to the presence of gray bat foraging habitat on site and a known hibernaculum greater than 1.5 miles away.

The painted snake coiled forest snail occurs in damp limestone outcrops, typically in crevices or under overhanging ledges. Slopes are very steep, often terminating in sheer cliffs that drop to the creek bed below. The habitat is thickly forested and has a profuse ground cover. No suitable habitat exists for the painted snake coiled forest snail on the Project Site or in the TL upgrade locations.

3.5.4.1.1.2 Aquatic Species

The Barrens topminnow occurs in waters of springs, spring runs, and first and second order headwaters and creeks with calm, shallow, unshaded and heavily vegetated spring pools. Marginal suitable habitat exists for the Barrens topminnow. During targeted field surveys, it

was determined that the quality of potential habitat for the Barrens topminnow species on the Project Site was marginal, and after considerable effort, the fish was not observed.

Suitable habitat for the other federally listed aquatic species included on Table 3-11 was determined during field surveys to not occur on the Project Site.

3.5.4.1.1.3 Plants

Review of the RNHD and IPaC indicated that there are no federally listed plant species occurring within three miles of the Project Site or the TL upgrade locations.

3.5.4.1.2 . State-Listed Species

3.5.4.1.2.1 Terrestrial Animals

The RNHD and IPaC indicated ten state-listed terrestrial animal species potentially occurring within three miles of the Project Site or the TL upgrade locations: little brown bat, tri-colored bat, pygmy shrew, Bachman's sparrow, common barn owl, osprey, southeastern shrew, common shrew, northern pine snake, and the eastern slender glass lizard (Table 3-11). The little brown bat and tri-colored bat inhabit wet meadows, damp woods, and uplands, including abandoned structures and sinkhole fissures/karst features. Suitable summer habitat was observed within the Project Site; however, neither of these bat species were caught during the mist net survey. The Bachman's sparrow inhabits mature pine forests with grassy understories. Marginal suitable habitat exists for the Bachman's sparrow on the Project Site. The osprey inhabits coastal marshes, lakes, and rivers. No suitable habitat was observed within the TL upgrade locations; however, they have potential to nest on TL pole structures. The pygmy shrew, southeastern shrew, and common barn owl inhabit grasslands, scrublands, groves, farms, fields, or towns. Suitable habitat exists within the Project Site and in the TL upgrade locations. The northern pine snake inhabits well drained sandy soils in pine or mixed pine/hardwood forest. Suitable habitat was not observed within the Project Site or in the TL upgrade locations. The eastern slender glass lizard inhabits dry grasslands and forest. Suitable habitat exists within the Project Site.

3.5.4.1.2.2 Aquatic Species

Eleven state-listed or protected fish species potentially occur within the Project Site: flame chub, coppercheek darter, longhead darter, ashy darter, redband darter, striated darter, slenderhead darter, golden darter, Tennessee logperch, southern cavefish, and the saddled madtom (Table 3-11). Targeted surveys for the state listed species were conducted in Hurricane Creek and its associated tributaries in May 2021. The flame chub was the only listed species collected. Flame chubs are dependent upon spring habitat with cool water temperatures provided by groundwater and tree canopy cover. The flame chub was collected at two separate sites within the Rock Creek drainage. The first site was within West Fork Rock Creek alongside SR 55 just upstream of the Coffee County line. The second site was within North Fork Blue creek just adjacent to Cumberland Springs Road.

Suitable habitat for the other state-listed aquatic species included on Table 3-11 was determined during field surveys to not occur on the Project Site.

3.5.4.1.2.3 Plants

Review of the RNHD and IPaC indicated that 23 Tennessee state-listed plant species have been previously reported within a five-mile vicinity of the project area (Table 3-11). All habitats on the Project Site were surveyed, and eight state-listed species were observed on the Project Site. These species included Barratt's sedge, button sedge, dwarf sundew, slender blue flag, black footed quillwort, Virginia chain fern, iris leaved yellow-eyed grass,

and Tennessee feather bells. Two of these species, slender blue flag and Tennessee feather bells, were also observed in the TL upgrade locations.

- Barratt's sedge was observed in one location on the Project Site, primarily in a single dense patch several hundred square feet in size in a wet forest near SR 130 in the northern portion, as well as sporadically throughout this vicinity of the Project Site. Button sedge occurs in extensive colonies at multiple locations on the Project Site, including one area where the species dominated. The species was observed in flower and fruit at all locations.
- Dwarf sundew is often found in disturbed areas devoid of vegetation in Tennessee. On the Project Site, dwarf sundew was seen along an old logging road, growing in full-sun conditions most frequently in ruts made by logging equipment.
- Slender blue flag was observed growing both in full shade on the Project Site and within a grassland in the TL upgrade locations in full sun. These plants were observed in a handful of locations on the Project Site, but the total population did not occupy more than 10 to 15 square feet. The TL ROW population of slender blue flag was more robust, with plants covering up to 100 square feet in total.
- The black footed quillwort, a fern-like plant, was observed in intermittent and perennial stream channels. A formal count of individuals was not made, but at least 100 individual plants were observed; more individuals are likely present.
- A single population of the Virginia chain fern was observed growing within a depression pond in a closed canopy forest, where it covered several thousand square feet of the wetland complex.
- The iris leaved, yellow-eyed grass was observed growing in two different habitat types. About 20 individuals were found within a natural depression pond in full sun. In the second location, over 100 plants grew within the channel of the West Fork of Rock Creek. The species prefers areas that are inundated much of the year but not within deeper pools.
- Tennessee feather bells had been previously collected from the Project Site, and the Project-related survey recorded multiple new locations of the plant. Plants were observed growing in the full sun of open TL ROW, along forested edges in the partial sun, and in the dense shade of early successional forest on the Project Site. Tennessee feather bells in partial sun were taller and in flower more vigorously. The species also seems to prefer the edge of wetlands between wettest portions of a site and the adjacent uplands.

In addition to these rare plant species, an approximately 130-acre area of the globally rare Willow Oak - White Oak / Black Highbush Blueberry - (Possumhaw) / Barratt's Sedge Wet Forest community, as defined by NatureServe, is present on the Project Site. Five of the observed state-listed plant species were found within this habitat, including Tennessee feather bells, Barratt's Sedge, black footed quillwort, button sedge, and Virginia chain fern. This rare plant community is endemic to the Eastern Highland Rim of Tennessee in the vicinity of Tullahoma.

Tennessee feather bells and Barratt's sedge are very rare, and the populations identified on the Project Site are important for the long-term conservation of the species in Tennessee. Occurrences of Tennessee feather bells are particularly important because the species only occurs in Tennessee and persists at approximately 10 to 15 locations in a region that is experiencing rapid development and population growth.

3.5.4.1.3 Environmental Consequences

3.5.4.1.3.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to rare, threatened, or endangered species would be occur if current land use practices continued.

3.5.4.1.3.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

3.5.4.1.3.2.1 *Terrestrial Animals*

Three federally listed bats and the state-listed common barn owl, Bachman's sparrow, pygmy shrew, little brown bat, tri-colored bat, eastern slender glass lizard, and northern pine snake have suitable habitat on the Project Site and/or in the TL upgrade locations. Prior to the TL upgrades, TVA would perform an aerial nest survey of each pole structure to identify active osprey or eagle nests, and if identified, TVA would engage USDA-Wildlife Services as appropriate to provide guidance on avoidance and minimization measures and ensure compliance under federal law prior to commencement of work. With these measures, Project actions would not impact bald eagles and would, therefore, be in compliance with the National Bald Eagle Management Guidelines.

No known hibernacula for the federally listed gray bat, Indiana bat, or northern long-eared bat exist on the Project Site or the TL upgrade locations. Suitable summer roosting habitat for Indiana bat, and northern long-eared bat occurs throughout the Project Site in trees with suitable roosting characteristics, particularly those near water sources. Suitable foraging habitat for all three bats also occurs on the Project Site. A mist net survey for Indiana bat and northern long-eared bat was conducted in May 2021, and these bat species were not caught. Gray bats were caught on site, likely due to the presence of gray bat foraging habitat on site and a known hibernaculum greater than 1.5 miles away.

Approximately 780 acres of potentially suitable summer roosting, low- to moderate-quality habitat would be removed on the Project Site. High-quality bat habitat would be avoided. No tree removal is anticipated in the TL upgrade locations. No clearing limits as they pertain to federally listed bats are anticipated from USFWS given the results of the mist net survey. Some buildings have the potential to be removed for the Project; however, these have low potential for providing suitable habitat for federally listed bats. Streams and ponds offer foraging habitat and sources of drinking water for all four bat species within and adjacent to the Project Site. Other than limited effects to small areas of USACE-jurisdictional ephemeral streams and non-USACE-jurisdictional ditches, as well as some non-USACE-jurisdictional wetland and open water impacts, the Project would avoid streams, wetlands, and ponds, and these would be protected by 50- to 60-foot avoidance buffers. Consultation

with USFWS under Section 7 of ESA is underway regarding potential impacts to federally listed terrestrial species (Appendix A).

While no known hibernacula for the state-listed little brown bat or tri-colored bat exist on the Project Site or in the TL upgrade locations, suitable summer roosting habitat for these bats occurs on the Project Site in trees with suitable roosting characteristics, particularly near water sources. Suitable foraging habitat for these state-listed bats also occurs on the Project Site. However, based on the lack of captures of the state-listed little brown bat and tricolored bat during the mist net survey, populations of these species are not expected to be significantly impacted by the proposed actions.

Although the implementation of the Project would reduce habitat for the two state-listed reptile species and the two state-listed bird species that potentially occur on the Project Site, particularly those occupying woodlands, the effect on these state-listed species would be localized and minor.

3.5.4.1.3.2.2 Aquatic Species

West Fork Rock Creek and North Fork Blue Creek on the Project Site, which provide habitat for the federally listed Barrens topminnow and the state-listed flame chub, would be largely avoided by the Project activities. Vegetation immediately adjacent to West Fork Rock Creek, North Fork Blue Creek, and Spring Creek would be cleared by hand to reduce disturbance to the streams.

Spring Creek within the TL ROW provides suitable habitat for the state-listed flame chub. Ground disturbance would be minimized, and all work would be conducted in accordance with the relevant BMPs outlined in TVA's BMP manual (TVA 2017a). With proper implementation of BMPs and adherence to CWA Section 404 and 401 permit requirements, no impacts to federal or state-listed aquatic species are anticipated from the TL upgrades.

3.5.4.1.3.2.3 Plants

The locations of sensitive plant species within the Project Site were carefully considered when designing the solar facility. With the current layout, no arrays would be placed within areas known to support state-listed plant species or rare plant communities, and implementation of the Proposed Action Alternative would result in no direct impacts to those populations. Given the existence of state-listed plant species on the Project Site, outside of the solar facility footprint, and as an environmental enhancement measure, TVA would work together with SR Tullahoma to develop a conservation plan that complements SR Tullahoma's regenerative agricultural model. The plan would have the dual beneficial effects of protecting and restoring globally rare plant communities and rare plant populations that occur on site.

3.5.4.1.3.2.4 Cumulative Impacts

The 1,430-acre area where the Project would impact vegetation is a mix of mostly forested areas and some scrub/shrub and open agricultural areas. Removal of approximately 780 acres of forest would occur, with some of the lost acreage being blocks of contiguous forest and other, along field edges or forest fragments. The Project Site would be revegetated and maintained as a meadow with a mix of perennial and annual, non-invasive grasses and forbs to attract pollinators and serve as sheep pasture.

RFFAs may occur at multiple locations near the Project Site, and these other projects would affect thousands of acres of vegetation and wildlife habitat. Given that agriculture is the

dominant land use in the areas suited for development, future development would likely not result in significant impacts to important terrestrial habitats. While RFFAs in the surrounding region could remove available habitats for wildlife in the foreseeable future, the impacts of the Project would not result in significant cumulative impacts to vegetation and wildlife due to the small area of vegetation to be removed and the type of forest and other vegetative communities to be removed.

Agricultural row crop fields do not provide suitable habitat for threatened and endangered terrestrial animal species assessed in relation to the Project Site. The 780 acres of forest proposed for removal may provide moderate- to low-quality suitable summer roosting habitat for Indiana bat and northern long-eared bat. Approximately 1,355 acres (63 percent of the existing forested area) of forested habitat would be retained, including all high-quality bat habitat identified on site, and most bodies of water on the Project Site would be avoided by the Project. These bodies of water offer foraging habitat for all three federally listed bat species. In addition, forested habitats would be removed in winter to avoid the summer roosting season for Indiana bat and northern long-eared bat. Actions related to the Project would not impact bald eagles. While other industrial parks in the surrounding region could remove additional habitats for federally listed bats in the future, TVA is consulting with USFWS regarding impacts to federally listed bats to ensure rangewide impacts to threatened and endangered species are minimized. The Project is not expected to result in significant cumulative impacts to threatened and endangered terrestrial animal species. Overall, because the impacts to federally listed animal species and state-listed plant and aquatic species would be avoided or minimized in consultation with the USFWS, reasonably foreseeable environmental trends and planned actions to threatened and endangered plants and animals would be minor.

Since the Project Site is in a relatively undeveloped, rural county, cumulative impact to general aquatic ecology and to aquatic threatened and endangered species may be more minimal given the presence of large areas of undeveloped, forested lands. However, there are several past, present, and foreseeable projects in the general area that include the use of undeveloped lands to support industrial or other intensive developments. These projects and their associated direct and indirect impacts are reasonably certain to gradually degrade existing streams and threatened and endangered aquatic species within the Proposed Action area over the next several decades. Negative Project impacts resulting from cumulative impacts may be lessened by the proposed mitigation measures outlined in Section 2.5. Cumulatively, Tullahoma County Solar would contribute to the long-term conversion of disturbed land with some forest management with timbering operations and agricultural uses to other industrial uses. However, this cumulative impact would not be significant because of the marginal value of these lands for species and habitat protection.

3.6 Natural Areas, Parks, and Recreation

3.6.1 Affected Environment

There are no developed parks or outdoor recreation areas on or in the immediate vicinity of the Project Site or the related TL locations. There are several parks just east of the Project Site, Tims Ford State Park is located to the south of the project, and the Arnold Engineering Development Complex (AEDC) Wildlife Management Area (WMA) is located five miles east of the Project Site (Figure 3-15).

The Project Site has been used for a variety of dispersed recreation activities in recent years, including hunting, wildlife viewing, and off-road vehicle use on a network of roads

and trails. Much of the area has been leased to hunting clubs and has been managed under quality deer management principals to enhance the experience for deer hunters. There is also a firing range on the Project Site.

3.6.2 Environmental Consequences

3.6.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, no Project-related impacts to recreational activities at parks and recreation areas would occur.

3.6.2.2 Proposed Action Alternative

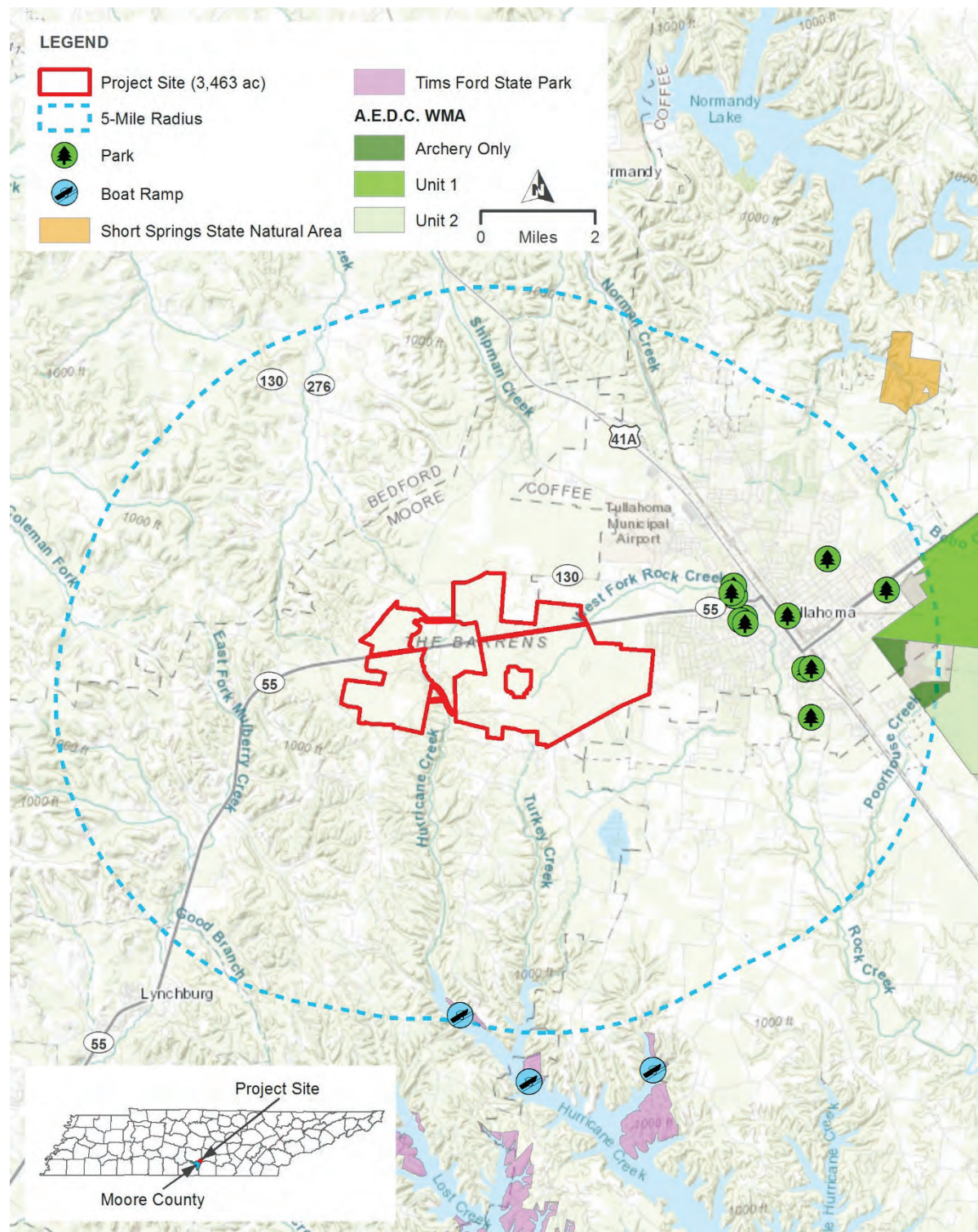
Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL. Because there are substantial distances between developed recreation area and the Project, no impacts on these recreation areas are anticipated.

Development of the Project would eliminate hunting and other dispersed recreational activities that have historically occurred on the Project Site. However, it is expected that these dispersed recreation activities could be accommodated at other similar rural lands in the surrounding area. Where solar development is not planned, hunting leases may remain. Therefore, Project impacts on dispersed outdoor recreational activities would be minor.

Portions of the TL upgrades are within the AEDC WMA Unit 2. Hunting would be temporarily impacted during the two-week installation of OPGW by helicopter if this method is determined the most feasible. Therefore, TL upgrades would have minor temporary impacts on recreation.

3.6.2.2.1 Cumulative Impacts

Future projects in the geographic area of analysis that include use of undeveloped lands to support industrial or other intensive developments would reduce the availability of lands suitable for recreation within Moore County. This would decrease the amount of potentially available land to support dispersed outdoor recreation activities such as, hunting, fishing, or nature observation. The combined effect of these future land development actions and the Project would likely result in a slight reduction in resources for dispersed recreation. However, in view of the relatively large amounts of rural and undeveloped lands within the county, cumulative impacts on dispersed recreation opportunities are expected to be minor. Because developed outdoor recreation areas are located sufficiently distant from the Project, no direct, indirect or cumulative impacts on these resources is expected.



3.7 Visual Resources

3.7.1 Affected Environment

Visual resources compose the visible character of a place and include both natural and human-made attributes. Visual resources influence how an observer experiences a particular location and distinguishes it from other locations. Such resources are important to people living in or traveling through an area and can be an essential component of historically and culturally significant settings. For this analysis, the scenery management system and associated analytical assessment procedures developed by the U.S. Forest Service (USFS) are adapted for use within a natural and human-built environment and integrated with planning methods used by TVA (after TVA 2016; USDA 1995). The general project area viewshed is evaluated based on its scenic attractiveness and scenic integrity. Scenic attractiveness is a measure of the scenic beauty of a landscape based on perceptions of the visual appeal of landforms, waterways, vegetation, and the human-built environment. Scenic attractiveness is assessed as either distinctive, typical/common, or indistinctive. As adapted for this analysis, scenic integrity measures the degree of visual unity of the natural and cultural character of the landscape. Scenic integrity is evaluated as either low, moderate, or high. This analysis also considers the existing character of the Project Site as an important factor in understanding the affected environment.

The Project area is a rural agricultural area with isolated single-family homes, small rural-residential concentrations, and some commercial and industrial development adjacent to highways. The Project area generally consists of flat to gently sloping land. Scenic attractiveness of the Project area is rated as typical or common of a rural agricultural and rural residential area. Scenic integrity is assessed as moderate due to the relative unity of the surrounding natural and cultural character. Photo 3-1 through Photo 3-4 show general views of the Project Site. The TL upgrade locations extend through a mix of forested areas and agricultural fields with scattered residences and some small residential concentrations.



Photo 3-1. Forested Land on the Project Site



Photo 3-2. Herbaceous and Scrub-Shrub Land on the Project Site



Photo 3-3. Woody Wetlands on the Project Site



Photo 3-4. Agricultural Land on the Project Site

Prominent visual receptors surrounding the Project Site, where more concentrated visual effects from the Project could occur, include three rural-residential concentrations, one along Five Points Road, adjacent to the northern boundary of the Project Site, one along Raysville Road, adjacent to the southern boundary of the Project Site, and one along West Lincoln Street, adjacent to the southern boundary of the Project Site; two isolated single-family homes and a business along Five Points Road, adjacent the northern boundary of the Project Site; two businesses along West Lincoln Street; and a chicken farm along SR 130, adjacent to the northern boundary of the Project Site (Figure 3-16; Photo 3-5 through Photo 3-10). The Project Site is bisected by SR 55 and Cumberland Springs Road, bounded to the north by SR 130 and Five Points Road, and bounded to the south by West Lincoln Street. The long-range views from SR 55, SR 130, and Five Points Road as they pass adjacent to the Project Site are generally obscured by mature trees. The long-range views from Cumberland Springs Road as it passes through the Project Site are also generally obscured by mature trees except for a small portion just northwest of its intersection with West Lincoln Street where the lack of trees results in unobstructed views to the north. The long-range views from West Lincoln Street as it passes adjacent to the Project Site are generally unobstructed to the north except for a portion with mature trees near its intersection with Cumberland Springs Road and partially obscured by mature trees to the south. TVA's existing Franklin–Wartrace No. 2 161-kV TL extends north-south through the Project Site.

Table 3-12. Visual Receptors in the Vicinity of the Project Site

Visual Resource Location	Location Description	Visual Receptor Type	General Views of the Project Site from Visual Receptor
SR 55	Two-lane paved state road that extends northeast-southwest between the cities of Lynchburg and Tullahoma, bisecting the Project Site.	Traffic	Obscured by mature trees
SR 130	Two-lane paved state road that extends northwest-southeast along the northern boundary of the Project Site, between the cities of Shelbyville and Tullahoma.	Chicken Farm Traffic	Obscured by mature trees
Five Points Road	Two-lane paved public road that extends northeast-southwest along the northern boundary of the Project Site, between SR 55 and SR 130.	Rural residential concentration Isolated single-family homes Business Traffic	Obscured by mature trees
Cumberland Springs Road	Two-lane paved public road that extends northwest-southeast through the southern portion of the Project Site and provides access to the Project Site through its connections with SR 55 and West Lincoln Street.	Traffic	Partially obscured by mature trees
West Lincoln Street	Two-lane paved public road that extends northeast-southwest along the southern boundary of the Project Site, from Cumberland Springs Road on the Project Site eastward into downtown Tullahoma.	Rural residential concentration Businesses Traffic	Unobstructed to the north; partially obscured by mature trees to the south.
Raysville Road	Two-lane paved public road that extends northeast-southwest through the southern portion of the Project Site and provides access to the Project Site through its connections with Cumberland Springs Road, Bobo Hollow Road, and Cobb Hollow Road.	Rural residential concentration Traffic	Partially obscured by mature trees

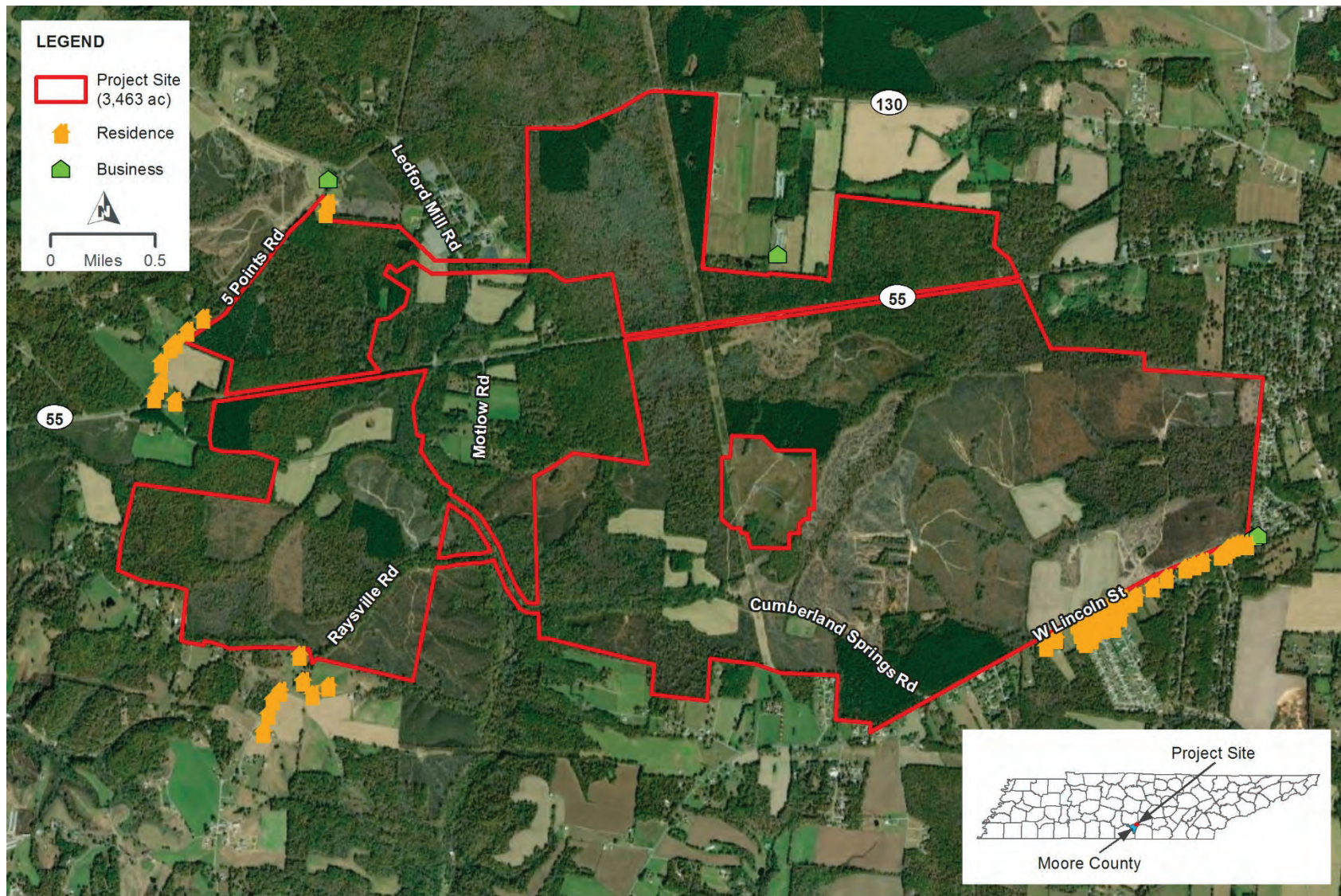


Figure 3-16. Prominent Visual Receptors in the Vicinity of the Project Site

Of the three rural-residential concentrations near the Project Site, the closest is adjacent to the southern boundary of the Project Site, along West Lincoln Street. Residences along West Lincoln Street are mix of one-story and two-story houses built in the early 1970s, mid-2000s, and mid-2010s (USGS 2019; Photo 3-5). Long-range views to the north from this portion of West Lincoln Street are unobstructed (Photo 3-6).

The residential concentration along Five Points Road is adjacent to the northwestern portion of the Project Site. This concentration consists of one-story ranch-style houses that were built in the early 1940s to early 1980s (USGS 2019). The residences are generally on lots surrounded by agricultural fields framed by mature trees (Photo 3-7). Long-range views to the east from this portion of Five Points Road are unobstructed (Photo 3-8).

The residential concentration along Raysville Road is adjacent to the southern portion of the Project Site. This concentration consists primarily of one-story ranch-style houses that were built in the early 1970s to late 1980s, but there are several residences that were built in the mid-2000s to mid-2010s (USGS 2019). The residences are generally on lots surrounded by agricultural fields (Photo 3-9). Long-range views to the northeast from this portion of Raysville Road are partially obscured by mature trees (Photo 3-10).



Photo 3-5. Small Residential Concentration Along West Lincoln Street, Adjacent to the Southeastern Portion of the Project Site (red boundary).



Photo 3-6. View of the Southeastern Portion of the Project Site, Looking North from West Lincoln Street (Google Street View, May 2019)



Photo 3-7. Small Residential Concentration Along Five Points Road, Adjacent to the Northwestern Portion of the Project Site (red boundary)



Photo 3-8. View of the Northwestern Portion of the Project Site, Looking East from Five Points Road (Google Street View, May 2019)



Photo 3-9. Small Residential Concentration along Raysville Road, Adjacent to the Southern Portion of the Project Site



Photo 3-10. View of the Southern Portion of the Project Site, looking Northeast from Raysville Road (Google Street View, May 2019)

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to visual resources would occur if current land use practices continued.

3.7.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Visual concerns are often associated with both large- and small-scale solar facilities and their electrical infrastructure. The Project generally consists of flat to gently sloping terrain, and the Project would convert what is largely now forested lands with some agricultural and rural-residential lands to an industrial use mostly consisting of low-profile PV arrays. Figure 2-2 shows the proposed Project elements. Photo 3-11 and Photo 3-12 show representative views of the type of solar panels proposed for the Project. From vantage points along Cumberland Springs Road, West Lincoln Street, and Raysville Road, the manufactured, structured appearance of the facility would be most apparent. The Project would likely be more visually intrusive in the morning and late afternoon, when the panels would be facing east or west, respectively, at their maximum tilt, with the upper edge of the panels about eight feet from the ground. This effect would be least at mid-day when the panel profile would be lying flat and about five feet tall.



Photo 3-11. Single-axis, Tracking PV System with Panels Showing Some Tilt as Viewed from the East or West



Photo 3-12. The Backside of the Solar Panels in Early Morning or Late Afternoon Configuration

Construction activities would temporarily alter the visual character of the project area. During construction, heavy machinery would be present, changing the visual aspects from project area vantage points. Within the 1,430-acre area to be developed for the Project, trees and other tall vegetation would be removed, and portions of the area would be graded, changing the contour, color, and texture of the scenery attributes. The Project Site would appear as a mixture of neutral colors such as browns and grays due to earthmoving, road construction, and concrete activities. Water would be used to keep soil from aerosolizing; thus, dust clouds are not anticipated. Visual impacts from construction would be minimal at night, as most construction is anticipated to occur during the day. Erosion control silt fences and sediment traps would be removed once construction is complete, and bare areas would be promptly vegetated.

Long-range views from the prominent viewing points near the Project Site along SR 55, SR 130, and Five Points Road are generally obscured by mature trees. Long-range views from the prominent viewing points near the Project Site along Cumberland Springs Road, West Lincoln Street, and Raysville Road are only partially obscured by mature trees. If left unbuffered, Project elements would be visible to the north from residences, businesses, and travelers along the majority of West Lincoln Street. Project elements would also be partially visible from residences and travelers along portions of Cumberland Springs Road and Raysville Road. However, in following county requirements for solar facilities, the Project would include a 60-foot-wide planted vegetative buffer composed of evergreen or other suitable plantings around the perimeter of the site between the Project site boundaries and Project fence, where existing natural buffers are not present along public rights-of-way and where receptors or known future receptors would view the facility. Lighting associated with the Project, including the Project substation, switchyard, and operations and maintenance building would be timer- or motion-activated and downward-facing and/or low glare to minimize impacts to surrounding areas; thus, minimal to negligible impacts to visual resources from Project lighting are expected.

Indirect impacts to visual resources in the Project Site vicinity may occur due to increased traffic and movement of heavy machinery on the Project Site and along local roads. Overall, there would be minor direct and indirect impacts to visual resources during the construction phase of the Proposed Action. These impacts would be temporary and would last approximately 18 months, subject to weather.

The visual alteration from forested land and some agricultural land to an industrial appearance in an area where scenic integrity is rated as moderate to high due to the relative unity of the surrounding natural and cultural character is expected to result in minor adverse visual impacts. Due to the relatively substantial mature tree buffers in most areas and the addition of planted vegetative buffer where receptors or known future receptors would view the facility, visual impacts during the operations phase of the Project would be minimal to minor in the immediate vicinity and negligible on a larger scale, due to variation of the visual attributes of the project area and diminished views of the facility as distance from the Project increases. Because most of the existing mature tree buffers are comprised of deciduous trees, their effectiveness in blocking views of the Project would be reduced from late autumn through early spring.

TVA would perform network upgrades to a 9.8-mile portion of the Franklin–Wartrace No. 2 161-kV TL. If used, a helicopter would be visible to residences near the TL during installation of OPGW in the vicinity, which would affect individual residences for no more than a few days. Other equipment associated with the TL upgrades may also be visible for a few days.

in the vicinity of individual residences. Modifications to the existing TL would likely be visible from travelers along Cumberland Springs Road during construction. Modifications of the existing TL is not expected to greatly change the visual effects to nearby residences. Overall, the TL upgrade work would likely result in temporary minor impacts to the visual resources in the vicinity of the TL upgrade locations.

3.7.2.2.1 Cumulative Impacts

The Proposed Action would alter the visual character of the Project Site by converting a large area of forested land and some agricultural land to numerous low-profile parallel rows of PV panels, an electrical substation, switchyard, and operations and maintenance building. Much of the developed Project Site would be screened from nearby public roads and residences. Visual impacts from other locations around the site perimeter would be low to moderate and mostly at middle ground distances. The potential industrial development of the RFFAs in the Project area could result in greater visual impacts due to the size of the buildings and supporting infrastructure. Because the visual impacts of the Proposed Action would be comparatively low and localized, the Proposed Action has little potential to result in adverse cumulative visual impacts.

3.8 Noise

This section provides an overview of the existing ambient sound environment in the project area, and the potential impacts to the ambient sound environment that would be associated with the No Action and Proposed Action Alternatives. Existing conditions for noise are generally discussed in relation to the vicinity of the Project Site and TL upgrade locations and presented in detail for the Project Site vicinity, where concentrated, longer term Project effects to noise receptors could occur. Project effects are also assessed for the TL upgrade activities.

3.8.1 Affected Environment

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). The human ear does not perceive all sound frequencies equally well. Therefore, measured sound levels are adjusted or weighted to correspond more closely to noise perceived by human hearing. The adjusted noise metric that most closely duplicates human perception of noise is known as the A-weighted decibel (dBA). The threshold of human hearing is 0 decibels (dB), and the threshold of discomfort or pain is around 120 dB.

A day-night average sound (L_{dn}) is a 24-hour noise descriptor used to assess noise impacts for land uses where people sleep and there is a heightened sensitivity to nighttime noise. The L_{dn} noise metric is recommended by USEPA and has been adopted by most federal agencies (USEPA 1974a, 1974b). An L_{dn} of 65 dBA is the level most commonly used for noise planning purposes, representing compromise between community impact and the need for activities such as construction. The dBA is the adjusted noise metric that most closely duplicates the human perception of noise. Areas exposed to an L_{dn} above 65 dBA are generally not considered suitable for residential use. An L_{dn} of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974a,b). For reference, approximate noise levels (measured in dBA) of common activities/situations are provided in Table 3-13.

Table 3-13. Common Sounds and Their levels

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Rock band
Gas lawnmower at 3 feet	90	Food blender at 3 feet
Downtown (large city)	80	Garbage disposal
Heavy traffic at 150 feet	70	Vacuum cleaner at 10 feet
Normal conversation	60	Normal speech at 3 feet
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room

Source: USEPA 1974a,b

Noises occurring at night generally produce a greater annoyance than do noises of the same levels occurring during the day. People generally perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are about 10 dBA lower than those during the day (USEPA 1974a, 1974b).

The 3,463-acre Project Site is within a residential and rural agricultural area approximately two miles west of the City of Tullahoma in Moore County. This area includes single-family homes, small residential concentrations, undeveloped lands and some commercial and industrial development adjacent to highways. Ambient noise at the Project Site consists mainly of agricultural sounds, such as noises from forest management with timbering operations and farm machinery, natural sounds from wind and wildlife, and moderate traffic sounds. Noise levels of these types generally range from 45 to 55 dBA (USDOT 2015).

The Project Site and a surrounding 0.5-mile radius were examined to identify potential noise-sensitive receptors. Noise-sensitive receptors are defined as those locations or areas where dwelling units or other fixed, developed sites of frequent human use occur. Approximately 9,433 noise-sensitive receptors are within the area examined (Figure 3-17). These primarily consist of residential farm complexes, associated outbuildings, and non-residential agricultural complexes, with each building generally counted as one receptor. Of these there are two churches (one off of Woosley Rd. and one off of Cobb Hollow Rd., Motlow State Community College, including 16 buildings, off of Leford Mill Rd., and three businesses (one off of Five Points Rd. and two off of West Lincoln Street). Other residential and rural-residential concentrations of noise-sensitive receptors occur around the perimeter of the Project Site, ranging from 167 feet to approximately 2,328 feet from proposed PV array locations. Residential concentrations are primarily located near the east, west and south portions of the Project Site.

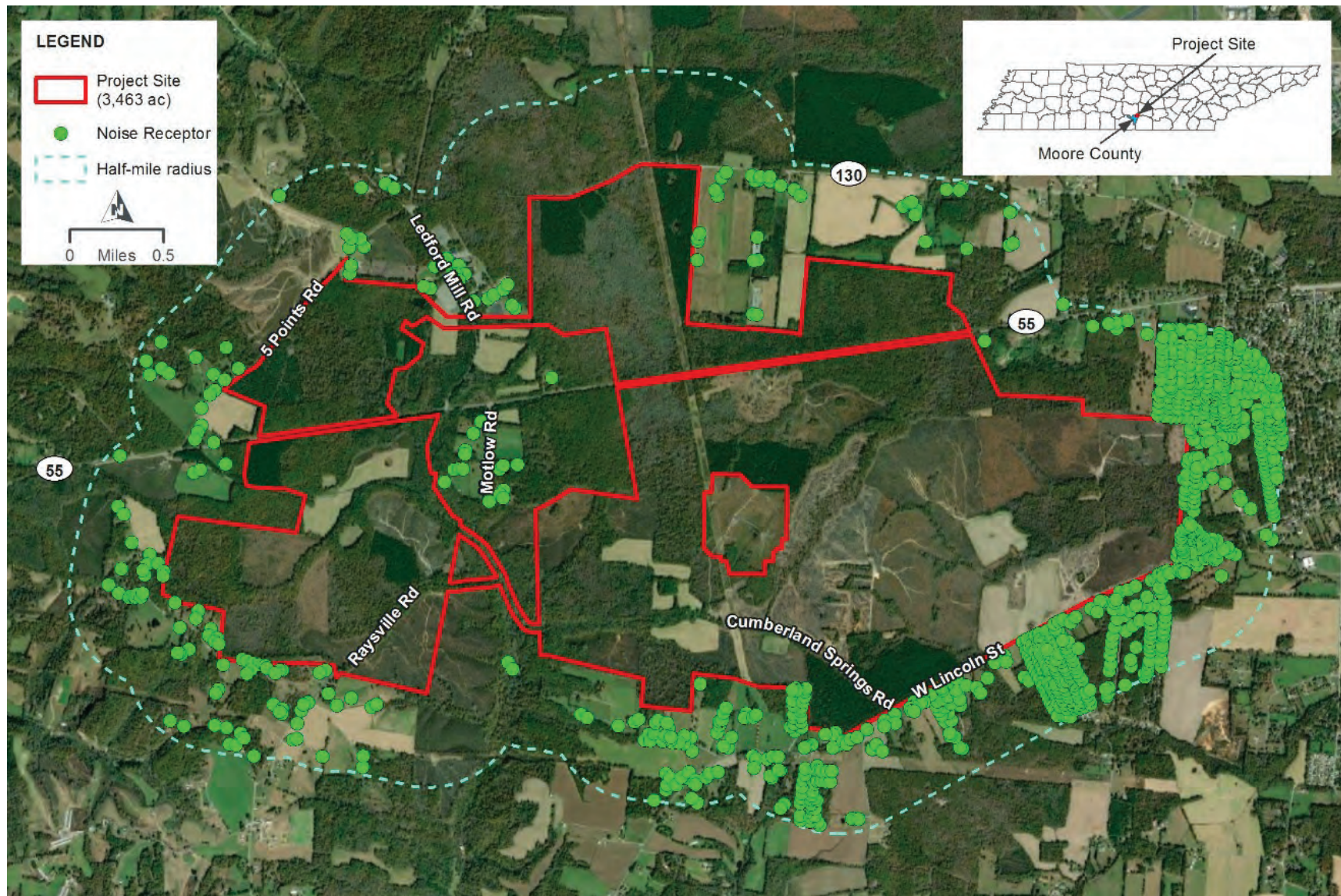


Figure 3-17. Noise-Sensitive Receptors in the Project Site Vicinity

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on the ambient sound environment would occur if current land use practices continued.

3.8.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Direct and indirect noise impacts associated with implementation of the Proposed Action would primarily occur during construction. Construction equipment produces a range of sounds while operational. Noisy construction equipment such as delivery trucks, dump trucks, water trucks, service trucks, bulldozers, chain saws, bush hogs, or other large mowers for tree clearing, produce maximum noise levels at 50 feet of approximately 84 to 85 dBA. This type of equipment may be used for approximately 18 months at the Project Site. The activity likely to make the most noise for an extended time period would be pile driving during the construction of the array foundations, which would be completed in six to 12 months. Standard construction pile drivers are estimated to produce between 90 to 95 dBA at a distance of 50 feet (USDOT 2015). The piles supporting solar panels would be driven into on-site soils and potentially into limestone, depending on the depths of piles and on the underlying residuum of limestone in areas where piles would be installed; however, overburden soil thickness will not be confirmed until geotechnical studies occur prior to construction.

Construction noise would cause temporary and minor adverse impacts to the ambient sound environment around the Project Site vicinity. Numerous residences and other noise receptors are located within a 0.5-mile distance from the Project Site and would temporarily experience heightened noise during construction, primarily from pile-driving activities. However, the existing traffic and agricultural noises in the vicinity would help make effects from the Project more minimal. Additionally, construction would primarily occur during daylight hours, between sunrise and sunset; therefore, the Project would not affect ambient noise levels at night during most of the construction period. Most of the proposed equipment would not be operating on site for the entire construction period but would be phased in and out according to the progress of the Project.

Construction workers would wear appropriate hearing protection in accordance with OSHA regulations. Noise-sensitive receptors near the TL upgrade locations would temporarily experience heightened noise during daylight hours primarily during pole drilling for the installation of five TL pole structures. Blasting may be required to install the array foundations and a few pole structures if bedrock is encountered, but these effects would be associated with some pilings and structures and would likely be short term. Noise receptors near the existing TL would also experience temporarily heightened noise during the approximately two-week installation of OPGW by helicopter, if this method is determined the most feasible.

Existing ambient noise in the project area generally ranges from 45 to 55 dBA and consists mainly of agricultural sounds, such as noises from farm machinery; natural sounds, such as

from wind and wildlife; and moderate traffic sounds. Within 50 feet of US 72 and SR 33 and other larger roads adjacent to the Project Site, traffic sounds may reach 70 to 80 dBA during high traffic periods (Corbisier 2003). Because construction would only occur during the day for most of the construction period, at the same time that more traffic noise and seasonal agricultural activities would occur, there would not be a significant difference in noise levels with implementation of the Project other than pile and pole driving activities during construction.

Following completion of construction activities, the ambient sound environment would be expected to return to existing levels or below, by eliminating the seasonal use of some agricultural equipment. The moving parts of the PV arrays would be electric-powered and produce little noise. The central inverters would produce noise levels of approximately 65 dBA at 33 feet, and the Project substation would each emit approximately 50 dBA at 300 feet. As no noise receptors are within 33 feet of the proposed inverter locations or within 300 feet of the Project substation, noise impacts from these Project components are anticipated to be minimal to negligible. Due to sheep operations on the Project Site during the operations and maintenance phase and lack of mowing or use of farm equipment, the Proposed Action would have lower noise levels than are typical on the Project Site currently with forest management with timbering operations.

Overall, implementation of the Proposed Action would result in minor, temporary adverse impacts to the ambient noise environment in the project area during construction, and minimal to negligible impacts during operation and maintenance of the solar facility.

3.8.2.2.1 Cumulative Impacts

Past, present, and RFFAs are expected to result in noise impacts in the project area. The projects are all located at minimum 1.5 miles from the Proposed Action. While the Proposed Action has the potential to contribute to cumulative impacts on noise, these impacts would be minor and short term.

3.9 Air Quality and Greenhouse Gas Emissions

3.9.1 Affected Environment

Ambient air quality is determined by the type and concentration of pollutants emitted into the atmosphere, the size and topography of the air shed in question, and the prevailing meteorological conditions in that air shed. Through its passage of the Clean Air Act of 1970 and its amendments, Congress mandated the protection and enhancement of our nation's air quality. USEPA established the National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants to protect the public health and welfare: sulfur dioxide (SO₂), ozone (O₃), nitrogen dioxide (NO₂), particulate matter whose particles are less than or equal to 10 micrometers (PM₁₀), particulate matter whose particles are less than or equal to 2.5 micrometers (PM_{2.5}), carbon monoxide (CO), and lead.

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect public welfare (e.g., visibility, crops, forests, soils, and materials) from any known or anticipated adverse effects of air pollutants. Areas in compliance with the NAAQS are designated "attainment" areas. Areas in violation of the NAAQS are designated as "nonattainment" areas, and new sources proposed to be located in or near these areas may be subject to more stringent air permitting requirements. Nonattainment areas are usually defined by county. Areas that cannot be classified on the basis of available information for a particular pollutant are designated as "unclassifiable" and are treated as attainment areas unless proven otherwise. Finally, areas that were

formerly designated as nonattainment for a pollutant and later come into attainment, are then categorized as “maintenance” for that pollutant for the next 20 years, assuming they continue to meet the NAAQS for that pollutant. If an area remains in attainment for a 20-year maintenance period, the status reverts back to normal attainment.

3.9.1.1 Regional Air Quality

The Project Site is within a rural agricultural area of Moore County, just outside the western boundary of the city of Tullahoma. The Project Site is mostly forested land with recent logging operations and some wetland areas, croplands, and early successional fields. Several residential subdivisions are adjacent to the Project Site. Moore County has no active air quality monitoring sites listed in USEPA’s national database for NAAQS-regulated pollutants and is considered to be in attainment for all NAAQS. There are active monitoring sites for some pollutants (O₃, PM₁₀, and PM_{2.5}) in the city of Huntsville in Madison County, Alabama, approximately 45 miles southwest. Madison County is designated as in attainment for all NAAQS.

With respect to the newest NAAQS, issued in 2015 for 8-hour ozone concentration (70 parts per billion), the entire State of Tennessee and Alabama are considered to be in compliance with the 2015 ozone NAAQS, as of October 2021.

3.9.1.2 Regional Climate

Weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. Based on climate data for the city of Tullahoma, the coldest month is January, with average maximum and minimum temperatures of 47.6 degrees Fahrenheit (°F) and 27.8°F, respectively. The warmest month is July, with average maximum and minimum temperatures of 87.1°F and 67.0°F, respectively. Precipitation is highest from November through May and averages 58.6 inches per year (NOAA 2021a). On average, approximately 26 tornados occur in Tennessee each year (NOAA 2021b).

3.9.1.3 Greenhouse Gas Emissions

GHGs include natural and man-made compounds that disperse throughout the earth’s atmosphere. GHGs act as insulation and contribute to the maintenance of global temperatures. As the levels of GHGs in the atmosphere increase, the result is an increase in temperature on earth, commonly known as global warming.

Apart from water vapor, the primary GHG emitted by human activities in the US is carbon dioxide (CO₂), representing approximately 82 percent of total GHG emissions in the US (USEPA 2020 a). The largest source of CO₂ and of overall GHG emissions is fossil fuel combustion (USEPA 2021). GHG emissions from the TVA power system are described in TVA’s 2019 IRP Final EIS (2019a).

3.9.2 Environmental Consequences

3.9.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on climate or air quality would result if current land use practices continued.

3.9.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA

would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL. Minor direct impacts to air quality would result from construction and operation of the Project. Temporary impacts to GHG emissions expected during construction would be minimal. The Proposed Action would have longer term, minor beneficial impacts to air quality by increasing the capacity of non-emitting generating facilities providing power to the TVA system and reducing the need to generate power from emitting generating facilities.

3.9.2.2.1 Regional Air Quality

The majority of potential air quality impacts associated with the Proposed Action would occur during construction. Construction activities would create emissions from construction equipment and vehicles, contracted employees' personal vehicles, and fugitive dust suspension from clearing, grading, and other activities. Tree debris from clearing would be removed by either burning or chipping and grinding. As burning may occur, this could generate temporary localized air quality impacts due to smoke particles and gases. Any such burning of vegetative debris would be done in accordance with any local ordinances or burn permits and is not expected to have any health consequences for this sparsely populated rural area.

The use of construction equipment would cause a minor temporary increase in GHG emissions during construction activities. Combustion of gasoline and diesel fuels by internal combustion engines (haul trucks and off-road vehicles) would generate local emissions of PM, nitrogen oxides (NO_x), CO, volatile organic compounds, and SO₂. The total amount of these emissions would be small and, overall, would result in negligible air quality impacts.

Approximately 95 percent (by weight) of fugitive emissions from vehicular traffic over paved and unpaved roads would be composed mainly of particles that would be deposited near the roadways, along the routes taken to reach the Project Site. As necessary, fugitive dust emissions from construction areas and paved and unpaved roads would be mitigated using BMPs including wet suppression. Wet suppression can reduce fugitive dust emissions from roadways and unpaved areas by as much as 95 percent. Therefore, direct impacts to air quality associated with construction activities would be expected to be minor with appropriate mitigation.

3.9.2.2.2 Regional Climate

No noticeable direct or indirect impacts to the local or regional climate would be associated with the construction and operation of the proposed Project. Local or regional climate effects can occur, for example, with major changes in land use that affect the hydrological cycle, or that create large impervious surfaces, thus changing the radiative heat balance over a large area. The Project would change the surface characteristics somewhat, but it would have little effect on soil permeability and hydrologic characteristics of the developed area. Vegetation would still grow under and around the solar panels, tending to maintain a landscape with significant evapotranspiration of precipitation and avoiding the creation of a "heat island" effect. Therefore, average temperatures of the developed area are not expected to change significantly due to the proposed development.

3.9.2.2.3 Greenhouse Gas Emissions

The use of construction equipment would cause a minor temporary increase in GHG emissions during construction activities. Combustion of gasoline and diesel fuels by internal combustion engines (trucks and off-road vehicles) at the site and combustion of jet fuel if a helicopter is used for the installation of TL OPGW, would generate emissions of CO₂ and

very small amounts of other GHGs such as methane and nitrous oxide. Additional GHG emissions would occur from transporting materials and workers to the Project location, and GHGs would be emitted in the US or globally during production and transportation of the materials used for construction. The production of construction materials is expected to represent the largest portion of the Project-related GHG emissions. The total GHG emissions from construction would eventually be offset by Project operation, assuming that the electricity generated by the Project would offset the need for some fossil-fuel-based electricity generation and associated GHG emissions.

Tree and other tall vegetation removal (amounting to 780 acres) during construction of the Project would represent a minor loss of potential carbon sequestration. Trees and other tall vegetation currently remove CO₂ from the air and sequester it as biomass. The loss of this carbon sink would constitute a minor adverse direct and indirect impact as sequestration would have continued for the life of the vegetation and long into the future, assuming that other changes on the Project Site did not result in any deforestation. The loss of the carbon sink from tree removal would be at least partially offset by the increased sequestration of CO₂ by the permanent grass- and forb-dominated vegetation, relative to CO₂ sequestration by row crops, that would be maintained on the solar facility site.

The operation of the Project is not anticipated to have any negative impacts to air quality or GHG emissions. No emissions would be produced by the operation of the solar facility or electrical lines. However, sheep grazing would be integrated with the solar PV facility, thus adding some GHG emissions in the form of methane from enteric fermentation.

Minor emissions would occur during maintenance activities, including facility inspections and periodic mowing of parts of the site. Conversely, overall emissions of air pollutants from the TVA power system would decrease during operation of the solar facility. The nearly emissions-free power generated by the solar facility would offset the need for power that would otherwise be generated, at least in part, by the combustion of fossil fuels. The reduction in GHG emissions resulting from the operation of the solar facility would have little noticeable effect on regional or larger scales. It would, however, be a component of the larger ongoing system-wide reduction in GHG emissions from the TVA power system through reducing the need for some fossil-fuel-based electricity generation. The adverse impacts of GHG emissions and the beneficial impacts of TVA's reduction in GHG emissions are described in more detail in the TVA 2019 IRP (2019a).

3.9.2.2.4 Cumulative Impacts

Past, present, and RFFAs are expected to contribute a significantly higher percentage of non-GHG and GHG emissions to the region than the Proposed Action. This includes both temporary construction and long-term operational emissions. Additionally, the operational emissions from these other actions would be expected to have at least minor negative impacts on air quality in the region. However, the Proposed Action would provide at least a minor beneficial impact on air quality in the region due to producing renewable energy, which reduces fossil-fueled utility power generation. In addition, all other actions are expected to comply with applicable air quality requirements and permitting and would implement emissions reduction actions as part of construction activities (e.g., wetting of disturbed soils and other fugitive dust control measures). Therefore, no significant cumulative impacts from the Proposed Action and other actions are expected.

3.10 Cultural Resources

3.10.1 Affected Environment

Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities and/or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts.

Section 106 of the NHPA, as amended (54 U.S.C. § 300101 *et seq.*), addresses the effects of federal and/or federally funded projects on tangible cultural resources—that is, physically concrete properties—of historic value. The NHPA provides for a national program to support both public and private efforts to identify, evaluate, and protect the nation’s important cultural resources. Once identified, these resources are evaluated for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service. Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases) and if found to embody one or more of four different types of values, or criteria, in accordance with 36 CFR § 60.4.

Cultural resources that are listed or considered eligible for listing in the NRHP are called “historic properties.” Federal agencies are required by the NHPA to consider the possible effects of their undertakings on historic properties and take measures to avoid, minimize, or mitigate any adverse effects. NEPA requires federal agencies to consider how their undertakings may affect the quality of the human environment, including both cultural resources and those defined as historic properties, so that the nation may “preserve important historic, cultural, and natural aspects of our national heritage.” “Undertaking” includes any project, activity, or program that has the potential to affect a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency.

Considering an undertaking’s possible effects on historic properties is accomplished through a four-step review process outlined in Section 106 of the NHPA (36 CFR § 800). These steps are initiation, identification, assessment of adverse effects, and resolution of any adverse effects. A project may have effects on a historic property that are not adverse. However, if the agency determines that the undertaking’s effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR § 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site and erecting tall buildings or structures within the viewshed of a historic building in such a way as to diminish the structure’s integrity of feeling or setting and its ability to convey its historic and/or architectural significance. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesigning a project to lessen the effects or installing visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic buildings and structures sometimes involves thorough documentation of the resource by compiling historic records, studies, and photographs.

Agencies are required to consult with the appropriate SHPOs, federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA review to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered. Generally, these considerations as well as those of NRHP-eligible traditional cultural resources (also called traditional cultural properties; see Parker and King 1998) are accomplished through consultation with parties having a vested interest in the undertaking, as described above.

3.10.1.1 Identification Survey and Field Findings Summary

As part of the evaluation process, a Phase I cultural resources survey was conducted by New South Associates (New South) on the Project Site and vicinity from July to September 2021 and by HDR in January 2022 to determine the presence of archaeological and architectural cultural resources that are listed or eligible for listing in the NRHP (Gregory et al. 2022). The Area of Potential Effects (APE) for New South's archaeological survey included the entire Project Site, which encompasses 3,463 acres. HDR's archaeological survey of the TL upgrade locations included 33.4 acres, the portions of the TL upgrade locations that had not been previously surveyed. The portions of the TL upgrade locations that had been previously surveyed consist of 77.13 acres within the boundaries of Arnold AFB. As these areas had been surveyed, as documented by Arnold AFB, they were not part of the current survey effort, but these areas are considered in regard to Project effects.

A variety of field methods were used during this project. New South and HDR investigated areas with poor ground visibility (less than 50 percent ground surface visibility) by excavating 30-centimeter diameter shovel tests at 30-meter intervals. New South and HDR investigated areas with good ground visibility (50 percent or greater ground surface visibility) through pedestrian survey. The Project Site contains several large wetland areas that were subjected to pedestrian survey. Additionally, several areas within the Project Site had been recently logged and were heavily eroded and disturbed. New South excavated 15,564 pre-plotted shovel tests on the Project Site, and HDR excavated 35 shovel tests in the TL upgrade locations. In addition, New South excavated 207 delineation shovel tests, for a grand total of 15,806 investigated locations. Where artifacts were encountered, radial shovel tests were excavated at 10-meter intervals to delineate the archaeological site boundaries.

The area examined for architectural resources, referred to herein as the Viewshed, included the 3,463-acre Project Site and the portions of a 0.5-mile radius surrounding the Project Site that are visually connected by direct line-of-sight. Areas within the survey radius that were determined not to be within view of the Project due to terrain, vegetation, and/or modern built environments, are not considered part of the Viewshed. In coordination with TVA, a survey for aboveground architectural resources in the areas of the TL upgrade locations was determined not necessary given the lack of proposed new visual features.

The associated cultural resources reports provide preliminary NRHP evaluations and results summaries (Appendix A; Gregory et al. 2022; HDR 2022). The report for the Project Site provides historic contexts for the two pertinent cultural resources nearby, the Jabel Ray Homeplace Cemetery (HS-4) and the Motlow House (HS-7).

The Jabel Ray Homeplace Cemetery (HS-4) is a small family cemetery located in a thickly wooded area approximately 300 feet south of Cumberland Springs Road. Headstones are located on the east and west sides approximately 30 feet apart. There are also many fieldstone markers without inscriptions. Jabel Ray (1810-1858) was a farmer born in South Carolina. In 1850 he was a farmer living in Franklin County with his wife Elizabeth and nine children. New South was unable to discern the gravesites of Jabel and Elizabeth Ray. New South recommends the Jabel Ray Homeplace Cemetery not eligible for listing in the NRHP under Criterion C, though the cemetery should be avoided (Gregory et al. 2022:111-113).

The Motlow House (HS-7) is situated on 6.5 acres of open yards with mature trees and a semicircular driveway, located on the north side of SR 55. The Motlow family was one of the largest holders of land in Moore County. They owned much of the acreage leased for the Motlow Range (HS-1). The World War II-era Motlow Range was an auxiliary training area for Camp Forrest. Motlow Range contained a series of firing ranges for light artillery, mortars, and machine guns. It was decommissioned in 1946. Lem Motlow (1869–1947) was a nephew of Jack Daniel. The 1958 Colonial Revival-style Motlow House was the home of Conner and Elizabeth Motlow. The Motlow family donated 187 acres for the Motlow Community College along the northwest corner of the project site. New South recommends that the Motlow House is eligible for listing in the NRHP under Criterion C for architectural significance at the local level, with a period of significance of circa 1958 to 1971 (Gregory et al. 2022: 119-122).

3.10.1.2 Known Cultural Resources

Background research of the archaeological and architectural records maintained by the Tennessee Division of Archaeology (TDOA) and THC was conducted to determine the presence of recorded cultural resources within a one- to two-mile radius of the Project Site and TL upgrade locations.

A search of TDOA records revealed three previously recorded archaeological sites (40ME18, 40ME35, and 40ME42) within the APE and two additional archaeological sites (40CF225 and 40ME41) located within two miles of the APE. Background research for architectural resources identified no previously recorded architectural properties as potentially occurring within the Viewshed. TDOA records review for the TL upgrade locations identified 11 archaeological sites and 11 known historic properties and cemeteries within a one-mile radius. One of the archaeological sites, 40FR234, a prehistoric lithic scatter, overlaps the TL upgrade locations. However, this resource was in the portion of the TL upgrade locations that had been previously surveyed (on Arnold AFB), was previously determined ineligible for the NRHP, and was not included in the current survey due to an agreement with Arnold AFB to avoid the site.

HDR's field investigations of the TL upgrade locations identified no archaeological resources. New South's field investigations of the Project Site identified eight archaeological sites and 18 isolated finds. Of the eight sites, three (40ME18, 40ME35, and 40ME42) were previously recorded (Table 3-14). By definition, all 18 isolated finds lack integrity and significance and are recommended as not eligible to the NRHP. No further work is recommended for these resources. TVA recommends that all eight archaeological sites within the APE are not eligible to the NRHP due to a lack of integrity, significance, or both. One of these sites, 40ME35, has an associated historical cemetery and should be avoided. No further work is recommended for the other seven sites being recommended as not eligible to the NRHP.

Site 40ME42 contains the World War II-era Cumberland Springs Bivouac. Its boundary is approximate and covers a large area. The portions of the site within the APE were surveyed, and no mid-twentieth century deposits were identified. Given the lack of associated resources within the APE and the limited information from the original recording of the site, its potential for listing on the NRHP remains unclear. TVA believes that the portions of 40ME42 within the APE do not contain historic deposits that could contribute to the NRHP eligibility of the site. Therefore, no further work is recommended for this site within the APE. TVA is consulting with THC and federally recognized Indian tribes with an interest in the Project area on these determinations.

Table 3-14. Newly Recorded and Revisited Archaeological Sites Within the APE

Site Number	Cultural Affiliation	Site Type	NRHP Recommendation
40ME18	Late Paleoindian-Early Archaic	Lithic scatter	Not Eligible
40ME35	Late nineteenth century	Old Jabel Ray Homeplace Cemetery	Not Eligible
40ME42	Late nineteenth to mid-twentieth century, World War II	Cumberland Springs resort; Cumberland Springs Bivouac	Unknown; portion of the site within APE does not contribute to the site's eligibility
40ME46	Undetermined precontact	Lithic scatter	Not Eligible
40ME47	Twentieth century	Remains of the Mt. Ethel church and schoolhouse	Not Eligible
40ME48	Early twentieth century	Home site	Not Eligible
40ME49	Early twentieth century	House site	Not Eligible
40ME50	Early twentieth century	Home site	Not Eligible

The historic architecture survey of the Viewshed surrounding the Project Site resulted in fieldwork documentation of 12 resources; none of these resources had been previously surveyed by THC or previously listed in or determined eligible for the NRHP. The 12 surveyed resources consist of a former military training range (portions of which overlap the Project Site), individual dwellings, a residential subdivision, the ruins of a mineral springs resort, two cemeteries (one of these is the on-site cemetery, 40ME35, also discussed above), and two road corridors.

Table 3-15. Historic-Age Architectural Resources within the Viewshed.

Survey #	Property Location	Description	NRHP Recommendation
HS-1*	Flanks north and south sides of Lynchburg Highway (SR 55) and Cumberland Springs Road	Motlow Range	Not Eligible
HS-2	Linear resource	Old Shelbyville Highway	Not Eligible
HS-3	Linear resource	Lynchburg Highway	Not Eligible
HS-4	Cumberland Springs Road	Jabel Ray Homeplace Cemetery	Not Eligible
HS-5	Bennett Road	Williams Family Cemetery	Not Eligible
HS-6	South side of Cumberland Springs Road	Former mineral springs resort	Not Eligible
HS-7	7871 Lynchburg Highway	Motlow House	Eligible
HS-8	2601 Old Shelbyville Highway	Hartley House	Not Eligible
HS-9	2485 Old Shelbyville Highway	Edens House	Not Eligible
HS-10	2445 Old Shelbyville Highway	Blair House	Not Eligible
HS-11	2405 Old Shelbyville Highway	Glascoe House	Not Eligible
HS-12	Sharondale Drive & Marbeth Lane	Sharondale Subdivision	Not Eligible

*The full extent of this resource, which encompasses a large portion of the Project Site, is not depicted on the figure.

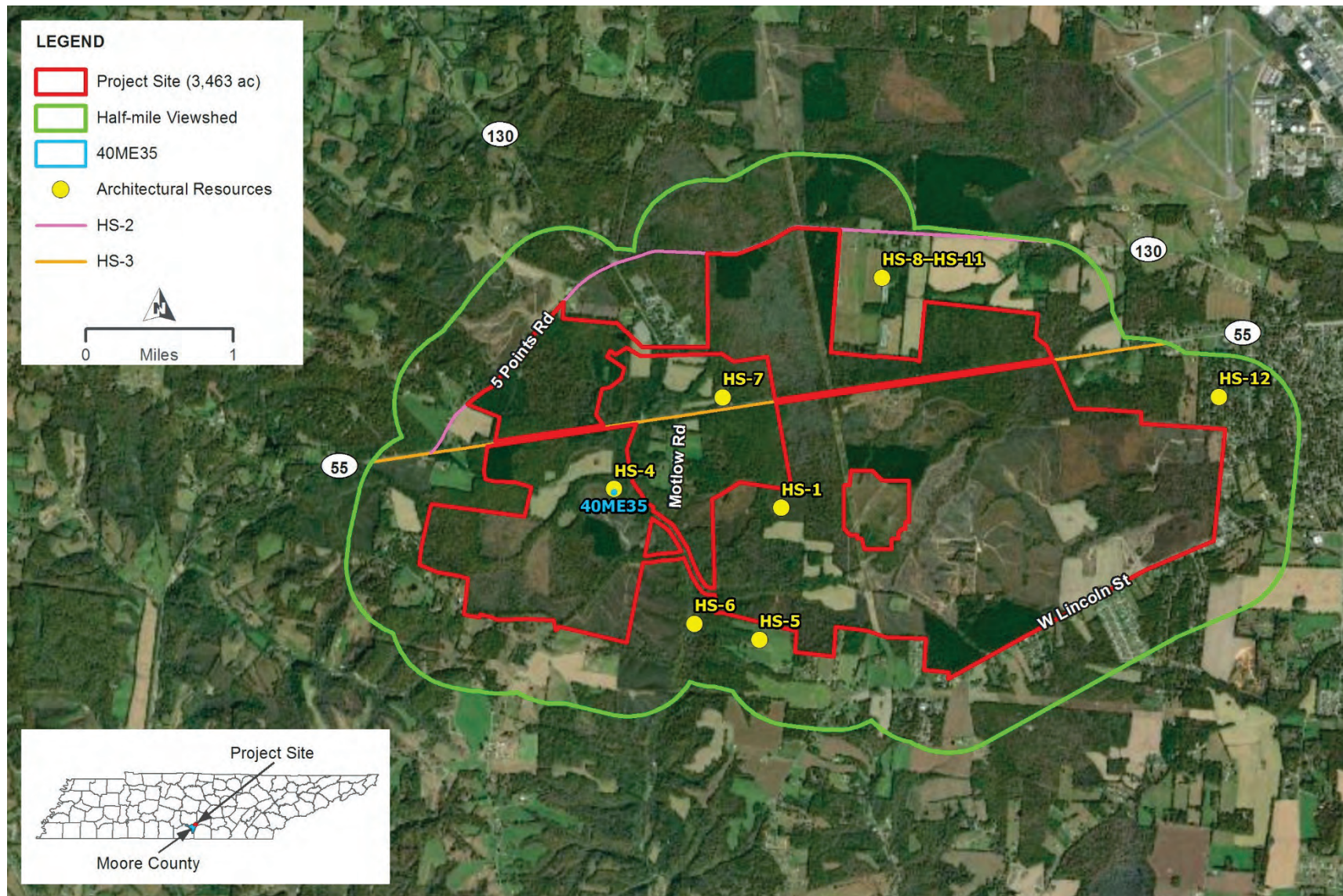


Figure 3-18. Architectural Resources in the Project Site Viewshed

3.10.2 Environmental Consequences

This section describes the potential impacts to cultural resources should the Proposed Action or No Action Alternative be implemented.

3.10.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on cultural resources would occur if current land use practices continued.

3.10.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Site 40ME35, located in a thickly wooded area in the western portion of the Project Site, contains the Old Jabel Ray Homeplace Cemetery. While this resource is not eligible for the NRHP, visual effects from the Project Site should be considered. TVA designed the Project to allow a minimum 250-foot wooded avoidance buffer between the nearest solar panels and the cemetery. TVA finds that the Project would have no visual effect on the Old Jabel Ray Homeplace Cemetery.

Resource HS-7, the Motlow House, is located in a privately-owned outparcel in the central portion of the Project Site. The proposed NRHP boundary follows the 6.5-acre property boundary. The Project will include the installation of solar panels within a site located approximately 0.2 miles north and east and 0.5 miles west of the recommended NRHP boundary for the Motlow House. The Project will contain photovoltaic panels that will reach eight feet high at full tilt, a substation, internal access roads, and transformers. The current use of the Motlow House would not be impacted, nor would any of the resource's physical features within the recommended NRHP boundary. Due to forested screening and its distance of 0.2 to 0.5 miles from the Project Site, TVA recommends that the proposed undertaking will have no adverse effect on the Motlow House.

No cultural resources or historic properties would be affected by TL upgrade activities. Site 40FR234, located on Arnold AFB within the TL upgrade locations, was recommended for no further work due to a low density of cultural material and a lack of diagnostic artifacts (Matternes 1997:138). In keeping with Arnold AFB practices of archaeological site avoidance, TVA would avoid this site during the TL upgrade activities.

TVA is consulting with THC and federally recognized Indian tribes regarding its determinations (Appendix A). TVA is also consulting with federally recognized Indian tribes regarding properties of religious or cultural importance to their tribe.

3.10.2.2.1 Cumulative Impacts

The Project would avoid the NRHP-eligible Motlow House, located within an outparcel within the Project Site, as well as the Old Jabel Ray Homeplace Cemetery. The project would not visually affect the cemetery and would have no adverse effect on the Motlow House. While the past, present, and RFFAs may have adverse effects on cultural resources, the Project would not contribute to reasonably foreseeable environmental trends and planned actions due to the Project effects being avoided, not considered adverse, or

minimized through use of buffers. TVA will continue consultation with THC and federally recognized Indian tribes on its NRHP eligibility determinations, findings of effect, and avoidance, minimization, and mitigation measures.

3.11 Utilities

3.11.1 Affected Environment

The Project Site is within a rural agricultural area of Moore County, approximately two miles west of the city of Tullahoma. The TL upgrade locations extend south-southeast from the Project Site, crossing rural, unincorporated portions of Franklin, Coffee, and Moore counties, in the vicinity of the city of Tullahoma. Available power sources to the county residents within the Project area are electricity and natural gas. No significant renewable energy sources are currently located in the Project area.

3.11.1.1 Telecommunications

In addition to various mobile providers, telecommunication services in the Project area are provided by AT&T, Ben Lomand Connect, Earthlink, HughesNet, Mediacom, Monster Broadband, Spectrum, Tullahoma Utilities Authority (TUA) LightTube, United Communications, Viasat, and Xfinity (HighSpeedInternet.com 2021).

3.11.1.2 Electricity

In the Project area, electrical service is provided by Duck River Electric Membership Corporation (DREMC) and TUA, which purchase and distribute power generated by TVA (DREMC 2021; TUA 2021a). TVA's existing Franklin–Wartrace No. 2 161-kV TL crosses the central portion of the Project Site in a north-south orientation.

3.11.1.3 Natural Gas

In the Project area, natural gas service is provided by the Elk River Public Utility District (ERPUD 2020). There are no known natural gas transmission pipelines in the Project Site.

3.11.1.4 Water and Sewer

Water and sewer service in the Project area are provided either by Metro Moore County Utility Department, TUA, or through private wells and private septic systems (MUD 2021; TUA 2021b).

3.11.2 Environmental Consequences

3.11.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts to utilities would occur if current land use practices continued.

3.11.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system and upgrade portions of an existing TL.

Modifications to existing utilities would occur with implementation of the Proposed Action Alternative. This would include installation of approximately 9.8 miles of OPGW on the

Franklin–Wartrace No. 2 161-kV TL between Structures 272 and 273 and the Franklin substation, east of the Project Site. Electrical service for the Project would be provided by either DREMC or TUA. If utilized, DREMC or TUA would coordinate with customers if outages were necessary. If the TVA TL is utilized, TVA would negotiate an agreement with DREMC or TUA to supply the power to the solar facility. During construction, water would be needed for soil compaction and dust control. During operations, water would be needed to clean solar panels and to provide drinking water for the on-site sheep herd. The Project would obtain water by groundwater wells or by delivery via water trucks, or by TUA, the municipal water source for the city of Tullahoma and the surrounding area.

Due to the Project-related TL upgrades, there may be short-term adverse impacts to local utilities such as electricity connections when conducting the TL upgrades, bringing the solar facility on-line, or during routine maintenance of the facility. No long-term adverse impacts are expected to be associated with the Project. Implementation of the Proposed Action would result in additional renewable energy resources in the region and would, thus, constitute a beneficial impact to electrical services across the region.

3.11.2.2.1 Cumulative Impacts

The Project could cause occasional, short-term adverse impacts to local utilities such as electricity connections when conducting the TL upgrades or bringing the solar facility on-line or during routine maintenance of the facility. Thus, the Project, along with the past, present, and RFFAs, may contribute to some minor short-term outages in the project area as these facilities are constructed or maintained. Given the nature of the Proposed Action, long-term cumulative adverse impacts to utilities are not anticipated.

3.12 Waste Management

3.12.1 Affected Environment

RCRA states that "solid waste" means any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. "Hazardous materials" and "hazardous wastes" are substances which, because of their quantity, concentration, or characteristics (physical, chemical, or infectious), may present a significant danger to public health and/or the environment if released. These substances are defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. §§ 9601 et seq.) and the Solid Waste Disposal Act, as amended by the RCRA (42 U.S.C. §§ 6901 et seq.). Regulated hazardous wastes under RCRA include any solid, liquid, contained gaseous, or semisolid waste or combination of wastes that exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or is listed as a hazardous waste under 40 CFR § 261. Storage and use of hazardous materials and wastes are regulated by local, state, and federal statutes including the Emergency Planning and Community Right-to-Know Act (42 U.S.C. §§ 116 et seq.) and RCRA.

Available historical topographic maps document that the Project Site has consisted of agricultural land and wooded areas with limited residential development since at least 1936 but likely earlier, based on historical trends. The surrounding area has consisted of undeveloped land, agricultural fields, and residential properties with limited commercial and institutional development since at least 1936.

Collection and disposal of solid waste outside of incorporated municipalities in Moore County is conducted by private trash collecting companies. Solid waste is then transported

to local public and privately owned non-hazardous landfills. Various vendors offer hazardous waste removal.

3.12.2 Environmental Consequences

3.12.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore negligible to minor impacts to waste management resources would occur if current land use practices continued.

3.12.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL. Storage and use of liquid materials in the form of petroleum-based oils and fuels, and generation of liquid and solid wastes in the form of used oil, construction debris, packing materials, and general construction waste would occur. As described below, TVA and the facility operator would implement appropriate measures throughout the construction and operation of the Project to properly manage wastes. Consequently, the Proposed Action would not result in adverse effects from waste management.

3.12.2.2.1 Materials Management

During construction of the proposed solar facility, substation, and switchyard, materials would be stored on site in storage tanks, vessels, or other appropriate containers specifically designed for the characteristics of these materials. The storage facilities would include secondary containment in case of tank or vessel failure. Construction-related materials stored on site would primarily be liquids such as used oil, diesel fuel, gasoline, hydraulic fluid, and other lubricants associated with construction equipment. Safety Data Sheets for all applicable materials present on site would be made readily available to on-site personnel.

Fueling of some construction vehicles would occur in the construction area. Other mobile equipment would return to the on-site laydown areas for refueling. Special procedures would be identified to minimize the potential for fuel spills, and spill control kits would be carried on all refueling vehicles for activities such as refueling, vehicle or equipment maintenance procedures, waste removal, and tank clean-out. Fuel tanks and equipment may be stored on-site for approximately 18 months during construction of the Project. The total aggregate aboveground oil storage capacity would exceed 1,320 gallons, the threshold above which a SPCC plan is required (40 CFR part 112). Since no individual aboveground oil storage container has a capacity greater than 5,000 gallons, this facility meets the criteria for a Tier I qualified facility under USEPA's SPCC regulation; however, all bulk oil storage containers with a capacity of 55 gallons and/or more will be provided with secondary containment.

During operations, any bulk chemicals or petroleum products would be stored in storage tanks or designated chemical storage area. Chemical storage areas would be designed to contain leaks and spills. The transport, storage, handling, and use of chemicals would be conducted in accordance with applicable laws, ordinances, regulations, and standards. Various transformers would contain oil, the quantities of these materials stored on site

would be evaluated to identify the required usage and to maintain sufficient inventories to meet use rates without stockpiling excess chemicals.

In addition to the chemicals listed above, small quantities (less than 55 gallons, 500 pounds or 200 cubic feet) of janitorial supplies, office supplies, laboratory supplies, paint, degreasers, pesticides, air conditioning fluids (chlorofluorocarbons), gasoline, hydraulic fluid, propane, and welding rods typical of those purchased from retail outlets may also be stored and used at the facility. Flammable materials (e.g., paints, solvents) would be stored in flammable material storage cabinet(s) with built-in containment sumps. Due to the small quantities involved and the controlled environment, a spill could be cleaned up without significant environmental consequences.

SR Tullahoma would develop and implement a variety of plans and programs to ensure safe handling, storage, and use of hazardous materials (e.g., Hazardous Material Business Plan). Facility personnel would be supplied with appropriate personal protective equipment (PPE) and would be properly trained in the use of PPE as well as the handling, use, and cleanup of hazardous materials used at the facility and the procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials would be stored on site.

3.12.2.2.2 Waste Management

Construction of the solar facility is estimated to result in the generation of approximately 36,500 to 73,000 cubic yards of solid waste (an estimated 912 to 1,824 truck loads at 40 cubic yards each), consisting of construction debris and general trash, including pallets and flattened cardboard module boxes. TVA estimates that approximately 2,600 to 5,000 flatbed truck loads would be required for hauling equipment and removing waste during construction.

Information on wastes anticipated to be generated during Project construction is provided in Table 3-16.

Table 3-16. Summary of Construction Waste Streams and Management Methods

Waste stream	Origin and composition	Estimated frequency of generation	On-site treatment	Waste management method/offsite treatment
Construction waste – hazardous	Empty hazardous material containers	Intermittent	None	Return to vendor
Construction waste – hazardous	Used oil, hydraulic fluid, oily rags	Intermittent	None	Recycle, remove to offsite disposal location
Construction waste – non-hazardous	Steel, glass, plastic, wood/pallets, cardboard, paper	Intermittent	None	Recycle wherever possible, otherwise dispose to Class I landfill
Sanitary waste – non-hazardous	Portable chemical toilets – sanitary waste	Periodically pumped to tanker truck by licensed contractors	None	Ship to sanitary wastewater treatment plant

The anticipated quantities of waste produced during Project operation are summarized in Table 3-17. Universal wastes and unusable materials produced as a result of

implementation of the Proposed Action would be handled, stored, and managed in accordance with state requirements.

Table 3-17. Summary of operation waste streams and management methods

Waste stream and classification	Origin and composition	Estimated amount	Estimated frequency of generation	Waste management method	
				On-site	Off-site
Used hydraulic fluid, oils and grease-petroleum-related wastes	Tracker drives, hydraulic equipment	1,000 gallons/year	Intermittent	Accumulate for <90 days	Recycle
Oily rags, oil absorbent, and oil filters- petroleum-related wastes	Various	One 55-gallon drum/month	Intermittent	Accumulate for <90 days	Sent off site for recovery or disposed at Class I landfill
Spent batteries	Lead acid/lithium ion	1,000	Every 10 to 15 years	Accumulate for <90 days	Recycle

Waste collection and disposal would be conducted in accordance with applicable regulatory requirements to minimize health and safety effects. To the extent possible, waste will be recycled. Materials that cannot be recycled would be disposed of at an approved facility to be determined by the designated contractor(s). No waste oil would be disposed of on the Project Site.

If necessary, SR Tullahoma or the construction contractor would obtain a hazardous waste generator identification number from the State of Tennessee prior to generating any hazardous waste. Tennessee has not established state-specific spill prevention plans in addition to the federal SPCC plan requirements. However, the state requires many types of facilities to maintain a current contingency plan, including hazardous waste treatment, storage, and disposal facilities (TSDFs), underground storage tanks that contain oil or hazardous substances, sites seeking National Pollutant Discharge Elimination System (NPDES) permits for discharges, sites storing hazardous substances in aboveground tanks, and sites storing used oil. Standards for hazardous waste TSDFs fall under Rule 0400-12-01-.05. Copies of any spill and cleanup reports would be kept on site.

SR Tullahoma, through designated contractor and subcontractor personnel, would be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced. Disposal containers such as dumpsters or roll-off containers would be obtained from a proper waste disposal contractor. Records of the amounts generated would be provided to the designated Moore County Solar environmental specialist.

3.12.2.2.3 Wastewater

If utilized, permanent toilets would be connected to a Project septic system. The septic system and toilets would not be located within 100 feet of any stream or wetland and would

be designed based on other local requirements. No adverse effects are anticipated from wastewater treatment or disposal associated with the permanent toilets and septic system.

Wastewater potentially generated during construction or operations may include domestic sewage and wastewater from non-detergent equipment washing and dust control. Portable toilets or other temporary facilities would be used for the construction workforce. Water used for equipment washing and dust control would be handled in accordance with BMPs described in the Project stormwater/BMP plan. If an additive is required to help facilitate the cleaning process, then the wastewater stream or the waste product would need to be evaluated to ensure it is properly disposed of according to applicable federal, state and local regulations. With application of these BMPs, no adverse effects would be anticipated from wastewater generated during the Project.

3.12.2.2.4 Cumulative Impacts

Past, present, and RFFAs, together with the Proposed Action, would create new waste streams within the area. Storage and use of liquid materials in the form of petroleum-based oils and fuels, and generation of liquid and solid wastes in the form of used oil, construction debris, packing materials, and general construction waste would also occur. Overall, the Project effects, likely similar to the past, present, and RFFAs, would be mitigated through implementation of BMPs for waste and wastewater, SPCC plans, and hazardous material business plans. With proper planning and implementation of BMPs, adverse reasonably foreseeable environmental trends and planned actions from the Project in relation to waste management would not occur.

3.13 Public Health and Safety

3.13.1 Affected Environment

The Project Site is currently private property, made up of a combination of forested, herbaceous, woody wetland, and agricultural land uses. Public emergency services in the area include urgent care clinics, hospitals, law enforcement services, and fire protection services.

The Fast Pace Health Urgent Care – Tullahoma Clinic, located on Jackson Street, approximately two miles (five minutes) east of the Project Site, is the closest urgent care center to the Project Site. The Vanderbilt Tullahoma-Harton Hospital is the closest hospital, also located in Tullahoma, approximately three miles (seven minutes) northeast of the Project Site.

Law enforcement services in the city of Tullahoma are provided by the Tullahoma Police Department, approximately three miles (six minutes) east of the Project Site. Law enforcement services in Moore County are provided by the Moore County Sheriff's Department in Lynchburg, approximately seven miles (10 minutes) from the Project Site. Fire protection services are provided by the Tullahoma Fire Department, North Franklin County Volunteer Fire Department, and Metro Moore County Fire Department, located approximately three miles (seven minutes), five miles (eight minutes), and seven miles (10 minutes), respectively, from the Project Site.

The Tennessee Emergency Management Agency has the responsibility and authority to coordinate with state and local agencies in the event of a release of hazardous materials.

3.13.2 Environmental Consequences

3.13.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on public health and safety would result if current land use practices continued.

3.13.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Due to the proximity of the Tullahoma Regional Airport, prior to construction, TVA is filing Form 7460-1 with FAA via the Obstruction Evaluation/Airport Airspace Analysis filing tool (FAA 2022) to evaluate the effect of construction on air safety (14 CFR § 77). Effects from solar facilities are generally known for air traffic control towers (FAA 2021), and the Tullahoma Regional Airport does not have a tower. Thus, no effects on air safety are anticipated.

During construction, workers on the Project Site and TL upgrade locations would have an increased safety risk. However, because construction work has known hazards, the standard practice is for contractors to establish and maintain health and safety plans in compliance with OSHA regulations. Health and safety plans emphasize BMPs for site safety management to minimize potential risks to workers. Examples of BMPs include employee safety orientations; establishment of work procedures and programs for site activities; use of equipment guards, emergency shutdown procedures, lockout procedures, site housekeeping, and PPE; regular safety inspections; and plans and procedures to identify and resolve hazards.

Potential public health and safety hazards could result from increased traffic on roadways due to construction of the Project. Residential and other human use areas along roadways used by construction traffic to access the Project Site or TL upgrade locations would experience increased employee, commercial, and industrial traffic. Awareness of these residences and establishment of traffic procedures to minimize potential safety concerns would be addressed in the health and safety plans followed by construction contractor(s). The TL upgrade activities would primarily occur along the existing TL ROW that is regularly maintained and experiences operations and maintenance traffic, therefore; public health and safety impacts from these activities are anticipated to be minimal to negligible.

Approximately 2,500 gallons of fuel for vehicles would be kept on the Project Site in storage tanks during construction of the proposed solar facility. An SPCC plan would be implemented to minimize the potential of a spill and to instruct on-site workers on how to contain and clean up any potential spills. The perimeter of each grouping of Project elements would be securely fenced during construction and for the duration of operation, and access gates would normally remain locked. General public health and safety would not be at risk in the event of an accidental spill on site. Emergency response would be provided by the local, regional, and state law enforcement, fire, and emergency responders.

During operation, solar PV systems generate electromagnetic fields (EMF). However, according to a study published by North Carolina State University (2017), solar PV

technologies and solar inverters do not pose significant human health risks. EMF produced by electricity has enough energy to produce heat but not enough to remove electrons from a molecule or damage DNA. Distance from the EMF source, such as provided by the solar panel setbacks and security fencing proposed to surround separate portions of the Project, renders the exposure to EMF insignificant and, therefore, not harmful to human health. The strength of the EMF present at the perimeter of a solar facility within a building is substantially lower than the typical exposures to EMF from household sources such as refrigerators and microwave ovens (NIOSH 2014).

During operations, the Project would require some permanent staff on site to manage the land, which would help deter squatters from occupying the Project Site.

Overall, impacts to public health and safety in association with implementation of the Proposed Action would be considered temporary and minor.

3.13.2.2.1 Cumulative Impacts

As with the past, present, and RFFAs, the Project would comply with OSHA regulations and health and safety plans to prevent or minimize the negative effects of worker-related accidents. The Project would also comply with SPCC plans, hazardous material plans, and other waste management BMPs to avoid or minimize related health and safety issues. With proper planning and implementation of BMPs, cumulative impacts from the Project in relation to public health and safety would not occur.

3.14 Transportation

3.14.1 Affected Environment

3.14.1.1 Roads

The Project Site is bisected by SR 55 and Cumberland Springs Road, bounded to the north by SR 130 and Five Points Road, and bounded to the south by West Lincoln Street. SR 55 in the Project area is a two-lane paved state road that extends northeast-southwest between the cities of Lynchburg and Tullahoma. Cumberland Springs Road is a two-lane paved public road that extends northwest-southeast through the southern portion of the Project Site and provides access to the Project Site through its connections with SR 55 and West Lincoln Street. SR 130 is a two-lane paved state road that extends northwest-southeast along the northern boundary of the Project Site, between the cities of Shelbyville and Tullahoma. Five Points Road is a two-lane paved public road that extends northeast-southwest along the northern boundary of the Project Site, between SR 55 and SR 130.

West Lincoln Street is a two-lane paved public road that extends northeast-southwest along the southern boundary of the Project Site, between Cumberland Springs Road at the Project Site and SR 16 (US 41-A) in downtown Tullahoma. Ledford Mill Road is a two-lane paved public road that extends north-south through the northwestern portion of the Project Site and provides access to the Project Site through its connections with Five Points Road, SR 130, and SR 55. Motlow Road is a two-lane paved public road that extends north-south through the southwestern portion of the Project Site and provides access to the Project Site through its connections with SR 55 and Cumberland Springs Road. Raysville Road is a two-lane paved public road that extends northeast-southwest through the southern portion of the Project Site and provides access to the Project Site through its connections with Cumberland Springs Road, Bobo Hollow Road, and Cobb Hollow Road. US 41-A in the project vicinity is a three-lane federal highway consisting of two through lanes and a center two-way left-turn lane that extends northwest-southeast, approximately two miles east of

the Project Site in Tullahoma. There are also a few unnamed private dirt roads that extend through the Project Site.

3.14.1.2 Road Traffic

Existing traffic volumes on some of the roads in the Project area were determined using 2021 Average Annual Daily Traffic (AADT) counts measured at existing Tennessee Department of Transportation (TDOT) stations (TDOT 2021b). Five TDOT stations (Stations 3, 4, 5, 7, and 183) are located within one mile of the Project Site. The 2021 AADT count for Station 3, located on SR 130 adjacent to the northern boundary of the Project Site, was 724 vehicles. The 2021 AADT count for Station 4, located on Five Points Road adjacent to the northwestern boundary of the Project Site, was 459 vehicles. The 2021 AADT count for Station 5, located on SR 55 approximately 0.3 mile from the Project Site, was 5,728 vehicles. The 2021 AADT count for Station 7, located on Cobb Hollow Road approximately 0.4 mile west of the Project Site, was 2,346 vehicles. The 2021 AADT count for Station 183, located on West Lincoln Street adjacent to the southern boundary of the Project Site, was 4,278 vehicles.

3.14.1.3 Rail and Air Traffic

The closest rail line is operated by CSX Transportation and is located approximately two miles east of the Project Site. The closest general aviation airport is the Tullahoma Regional Airport in Tullahoma, located approximately one mile northeast of the Project Site. The airport has two asphalt/concrete runways with lengths of 5,501 and 5,002 feet and one turf runway 2,693 feet long. The closest major airport, and the only one in the vicinity with regular commercial passenger service, is the Nashville International Airport in Nashville, approximately 55 miles northwest of the Project Site. The airport has four runways, all with lengths of 7,700 feet or more. Additionally, Arnold AFB in Tullahoma has one runway 6,001 feet long, located approximately nine miles northeast of the Project Site. Although the airfield was decommissioned in 2009 and no aircraft are stationed at the base, military aircraft occasionally use this runway for training purposes.

3.14.2 Environmental Consequences

3.14.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor impacts on transportation resources would result if current land use practices continued.

3.14.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Given the distance from major airports, construction and operation of the proposed solar facility is not expected to affect operation of major airports in the region. However, per the FAA guidelines regarding solar facilities near airports (FAA 2021), TVA is filing Form 7460-1 with FAA via the Obstruction Evaluation/Airport Airspace Analysis filing tool (FAA 2022). This form is required due to the proximity of the Tullahoma Regional Airport and in order to develop avoidance, minimization, and/or mitigation measures pertaining to potential effects to the airport in coordination with FAA. Effects from solar facilities are generally known for air traffic control towers (FAA 2021), and the Tullahoma Regional Airport does not have a

tower. Thus, no effects are anticipated. The operation of the Project would not adversely affect aerial crop dusters operating in the vicinity of the Project Site.

Subject to weather, construction activities would take approximately 18 months to complete using a crew of up to 450 workers sourced locally to the greatest extent possible. Work would generally occur during daylight hours, Monday through Saturday. A majority of these workers would likely come from the local area or region. Other workers could come from outside the region, and if so, many would likely stay in local hotels in the vicinity. It is anticipated that workers would drive personal vehicles to the Project Site. Some of the individual workers and work teams would likely visit local restaurants and other businesses during the construction phase of the Project. Additional traffic due to deliveries and waste removal would consist of an average of three to seven vehicles per day during construction, as discussed in more detail below.

Due to the proximity of the Project Site to the city of Tullahoma and the Motlow State Community College Moore County/Tullahoma Campus, possible minor to moderate traffic impacts along SR 55, SR 130, Five Points Road, West Lincoln Street, Cumberland Springs Road, and Raysville Road could occur, as a large portion of the construction workers would likely commute to the Project Site from and through Tullahoma. Traffic flow around the Project Site would be heaviest at the beginning of the workday, at lunch, and at the end of the workday. SR 55 and Five Points Road would likely be used to directly access the northern portion of the Project Site. West Lincoln Street, Cumberland Springs Road, and Raysville Road would likely be used to directly access the southern portion of the Project Site. Several businesses and residences are present along SR 55, Five Points Road, and West Lincoln Street. Because Project access would be available from multiple directions and a variety of roads, traffic to the Project Site would be more dispersed. Use of mitigation measures, such as posting a flag person during heavy commute periods to manage traffic flow, prioritizing access for local residents, and implementing staggered work shifts during daylight hours, would minimize potential adverse impacts to traffic and transportation to minor or negligible levels.

Construction equipment and material delivery and waste removal would require an average of three to seven flatbed semi-trailer trucks or other large vehicles visiting the Project Site each day during the construction period. The Project Site would be accessed via routes that do not have load restrictions. These vehicles should be easily accommodated by existing roadways; therefore, only minor impacts to transportation resources in the project area would result from construction vehicle activity.

Several Project access roads would be maintained on the Project Site. Following construction, the compacted gravel roads would be maintained to allow access for inspection and maintenance activities. However, these roads would be closed to the public. Permanent access to the Project substation and switchyard would be off of Cumberland Springs Road.

Air traffic in the vicinity of the TL upgrade locations could be temporarily impacted during the two-week installation of OPGW by helicopter if this method is determined the most feasible. Flight paths would be determined prior to the installation of OPGW and filed with the appropriate authorities as required; therefore, impacts to air traffic would be temporary and minimized through appropriate mitigation.

During operations, the Project may require small groups of employees and contractors to be on site occasionally to manage the facility and conduct regular inspections, maintenance, and repairs, as well as to manage the on-site sheep herd. The addition of vehicles for these workers on local roadways would be accommodated by existing infrastructure; therefore, the operation of the Project would not have a noticeable impact on the local roadways.

When operations cease, the facility would be decommissioned and dismantled, and the Project Site would be restored per Project decommissioning requirements.

Decommissioned equipment and materials would be transported to an offsite recycling center or disposed of at an approved facility, which would require dump trucks, flatbed and rear-loader garbage trucks, and other large vehicles visiting the Project Site each day during the decommissioning period. The Project Site would be accessed via routes that do not have load restrictions. These vehicles should be easily accommodated by existing roadways; therefore, only minor impacts to transportation resources in the project area would result from decommissioning vehicle activity.

Overall, direct impacts to transportation resources associated with implementation of the Proposed Action would be anticipated to be minor. These impacts would be temporary and minimized through appropriate mitigation. The Proposed Action would not result in any indirect impacts to transportation.

3.14.2.2.1 Cumulative Impacts

The Project would implement minimization and mitigation measures if Project construction is expected to disrupt normal traffic patterns; thus, Project effects to road traffic would be temporary, minor, and minimized or mitigated. While effects to local, regional, and major airports is not anticipated, TVA would coordinate with the FAA regarding potential effects to the Tullahoma Regional Airport given its proximity. Past, present, and RFFAs are also expected to result in minor impacts to transportation. The proposed widening of SR 55 could contribute to cumulative impacts to traffic depending on the timing of that project. However, impacts would be short term and coordination could occur to minimize impacts to local commuters. Overall, with implementation of minimization and mitigation measures, the Project is not expected to contribute to reasonably foreseeable environmental trends and planned actions to area transportation.

3.15 Socioeconomics

3.15.1 Affected Environment

The proposed solar facility would be located within the metropolitan limits of Lynchburg in Moore County, Tennessee. The Project Site overlaps U.S. Census Bureau (USCB) 2019 Census Tract (CT) 9301, Block Group (BG) 1 and CT 9302, BG 1 (Figure 3-19). Generally, CT 9301 encompasses the eastern and southern portions of Moore County, and CT 9302 encompasses the northern and eastern portions of Moore County and includes the entire City of Lynchburg. The portion of CT 9301 that overlaps the Project Site is approximately 2,415 acres, or 73% percent of the total project area, and the portion of CT 9302 that overlaps the Project Site is approximately 894 acres, or 27 percent of the project area.

3.15.1.1 Population and Demographics

The population of Moore County is 6,461, and the nearby Coffee County has a population of 57,889 (USCB 2020a). Given Coffee County's proximity to the job site, it is likely that a portion of the construction and operations staff would live or stay there. The Tennessee State Data Center (2020) projects that the population of Moore County will increase by approximately 3.9 percent by 2040. Population trends for each associated CT as compared

with Moore County and the state are presented in Table 3-18. According to the 2015-2019 American Community Survey (ACS) 5-year estimates, the population of Moore County, CT 9301 BG 1, and CT 9302 BG 1 all had higher median ages (45.0, 45.9, and 45.1, respectively) than the state as a whole (38.7). Moore County had a higher percentage of people who were at least high school graduates (94.4 percent) than across CT 9301 BG 1 (86.6 percent), CT 9302 BG 1 (89.7 percent), and the state (88.7 percent) (USCB 2020a, 2020b).

Table 3-18. Population trends in the project area, county, and state

Geography	2010 Census	2020 ACS	Percent Change 2010- 2020	Projection 2040	Percent Change 2020- 2040
CT 9301 BG 1	1,820	1,633	-10.3	--	--
CT 9302 BG 1	1,787	1,945	8.8	--	--
Moore County	6,362	6,461	0.3	6,629	3.9
Coffee County	52,796	57,889	9.6	64,644	11.7
Tennessee	6,346,105	6,709,356	5.7	7,840,212	16.9

Sources: Tennessee State Data Center 2020; USCB 2020a, 2020b

--" indicates that no data is available

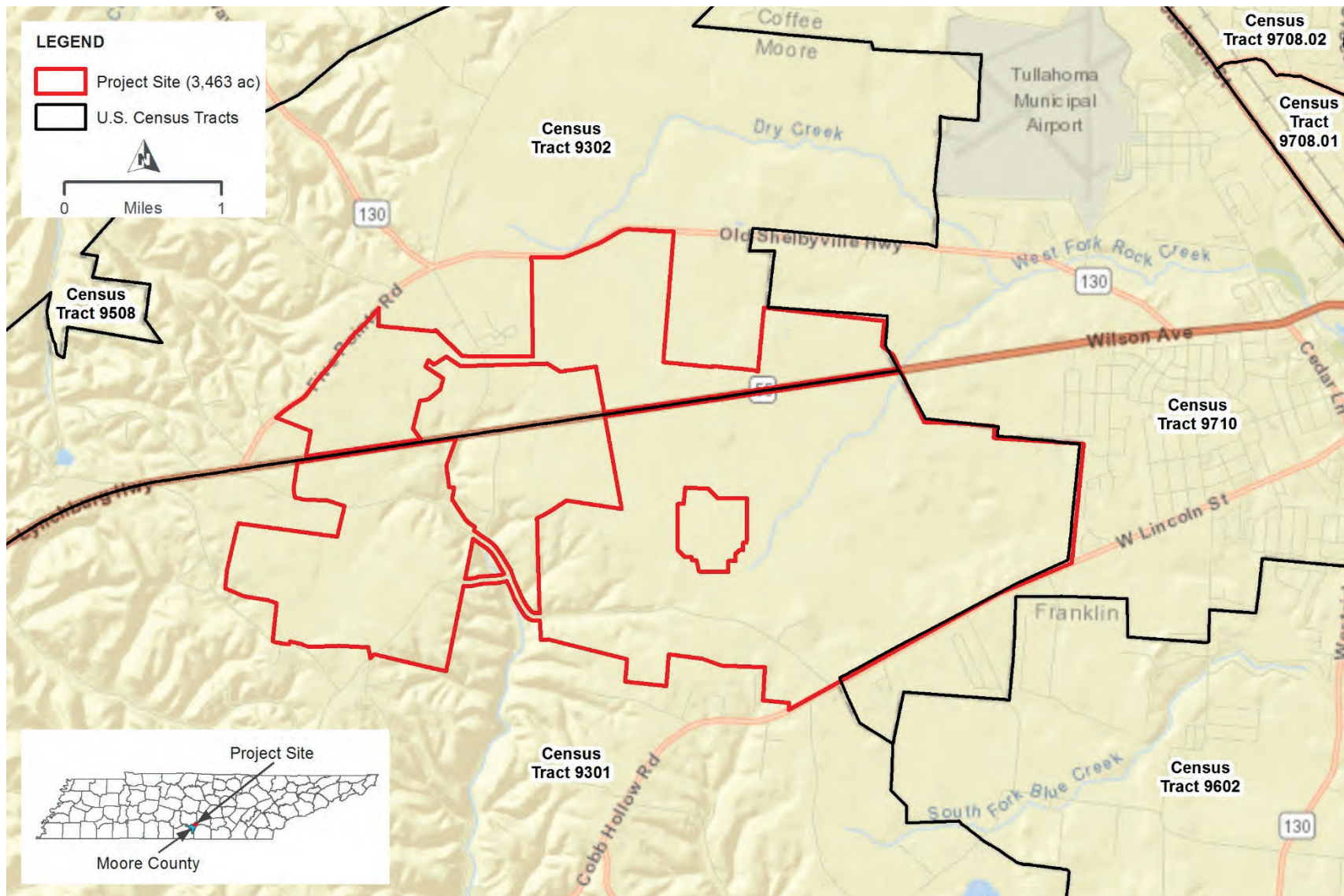


Figure 3-19. USCB CTs in the Project Site Vicinity

3.15.1.2 Employment and Income

According to the 2019 ACS, the unemployment rates for CT 9301 BG 1 (3.3%) and CT 9302 BG 1 (2.3%) were similar to the Moore County rate (2.3%) (TN Department of Labor and Workforce Development 2021) and the state (3.5%) (Table 3-19). The median household income for CT 9302 BG 1 (\$46,816) was lower than the county (\$57,708) and state (\$53,320), while CT 9302 BG 1 (\$60,114) was higher (USCB 2020d).

Table 3-19. Employment and income in the project area, county, and state

Geography	2019 Employment	2019/21 Unemployment Rate	Median Household Income, 2019 ACS
CT 9301 BG 1	783	3.3	\$60,114
CT 9302 BG 1	921	2.3	\$46,816
Moore County	2,955	2.3	\$57,708
Coffee County	19,426	4.9	\$50,531
Tennessee	3,301,501	5.3	\$53,320

Source: USCB 2020c.

3.15.2 Environmental Consequences**3.15.2.1 No Action Alternative**

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, minor beneficial socioeconomic effects from the Project would occur if current land use practices continued.

3.15.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Under the Proposed Action, a new solar facility and associated substation would be built in the project area. Subject to weather, construction activities would take approximately 18 months to complete using a crew of up to 450 workers sourced locally to the greatest extent possible. Work would generally occur during daylight hours, Monday through Saturday. Night-time construction could be necessary to make up schedule deficiencies or to complete critical construction activities. Short-term beneficial economic impacts would result from construction activities associated with the Project, including the purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers were obtained. It is likely some construction materials and services would be purchased locally in Moore County and/or in adjacent counties. Most of the other components of the solar and transmission facilities would be acquired from outside the local area. Also, most of the construction workforce would be sought locally or within the region, while a small portion of the construction workforce may come from out of the region. A large proportion of the non-local construction workforce would likely find lodging in the Tullahoma area, given its proximity and presence of several hotels and restaurants. Coffee County, and in particular the adjacent Tullahoma, is much closer to the project site and has more support (hotels, restaurants) than does the more distant developed part of Moore County.

(the immediate Lynchburg area). The direct impact to the economy associated with construction of the Project would be short term and beneficial.

The majority of the indirect employment and income impacts would be from expenditure of the wages earned by the workforce involved in construction activities, as well as the local workforce used to provide materials and services. Construction of the Project could have minor beneficial indirect impacts to population and short-term employment and income levels in Moore County, as well as Coffee County.

During operation of the solar facility, the Project may require small groups of staff to be on site occasionally to manage the facility and conduct regular inspections, as well as some shepherds to manage the on-site sheep herd on a regular basis. Therefore, operation of the solar facility would have a minor beneficial impact on employment and the population in Moore County and Tullahoma County.

Overall, socioeconomic impacts for the operation of the proposed solar facility would be beneficial and long-term, but minor relative to the total economy of the region. The Project would increase the overall property tax base of Moore County, which would be most beneficial within the county and the vicinity.

3.15.2.2.1 Cumulative Impacts

Economic benefits of the Proposed Action and the past, present, and RFFAs (Table 3-1) considered for this analysis include the purchase of materials, equipment, and services, and moderate short- to long-term increases in employment and income. These increases would be local or regional, depending on where the goods, services, and workers have been or are obtained. Overall, short- to long-term, moderate beneficial cumulative impacts to socioeconomics would result from implementation of the Proposed Action in combination with the other actions considered in the area. Indirect, cumulative impacts to socioeconomics would also occur from the expenditure of wages earned by the workforce involved in construction activities and facility operations.

3.16 Environmental Justice

3.16.1 Affected Environment

Environmental justice-related impacts are analyzed in accordance with EO 12898 to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority and low-income populations. While not subject to this EO, TVA routinely considers environmental justice in its NEPA review processes.

CEQ guidance directs identification of minority populations when either the minority population of the affected area exceeds 50 percent, or the minority population percentage of the study area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). CEQ defines minority populations as people who identify themselves as Asian or Pacific Islander, American Indian or Alaskan Native, Black (not of Hispanic origin), or Hispanic. Due to including one of these minorities, those indicating two or more races are also considered minorities.

CEQ guidance specifies that low-income populations are to be identified using the annual statistical poverty threshold from the USCB Current Population Reports Series P-60 on

Income and Poverty. The USCB-provided 2019 (the most current) poverty threshold for individuals under age 65 was \$13,465, and the official poverty rate for the U.S. as a whole in 2019 was 10.5% (CEQ 1997).

Based on CEQ guidance, USCB data reported in the 2019 ACS were used to identify minority and low-income populations in the project area. As discussed in more detail in Section 3.15.1, the Project Site overlaps CT 9301 BG 1 and CT 9302 BG 1.

3.16.1.1 Minority Population

According to the 2019 ACS, the percentage of minority population in Moore County, Coffee County, Franklin County, CT 9301 BG 1, and CT 9302 BG 1 (7.2, 9.6, 9.6, 1.1, and 6.7 percent, respectively) are lower than the state's minority percentage of 22.4 (Table 3-20, USCB 2020g). According to the USEPA EJSCREEN, an environmental justice screening and mapping tool, the project site and the surrounding 1-mile area have an estimated minority population proportion of 7 percent (USEPA 2020 b). This area includes part of Tullahoma in Coffee County. While the USCB and USEPA findings differ, both datasets indicate a minority population in the project area that is lower than the 50 percent threshold noted as significant in CEQ guidance.

Table 3-20. Minority Population in the Project Area, County, and State

Geography	Minority Population	% Minority Population
CT 9301 BG 1	18	1.1
CT 9302 BG 1	130	6.7
Moore County	459	7.2
Coffee County	5,285	9.6
Franklin County	3,990	9.6
Tennessee	1,504,224	22.4

Source: USCB 2020g

3.16.1.2 Low-Income and Poverty Population

Based on the 2019 ACS, the poverty rate in Moore County, Coffee County, Franklin County, CT 9301 BG 1, and CT 9302 BG 1 (7.7, 14.0, 14.4, 9.0, and 5.0 percent, respectively) are lower than the state's poverty rate of 15.2 percent (Table 3-21, USCB 2020e, 2020f, 2020h). According to the USEPA EJSCREEN, the low-income population, which is a higher threshold than poverty guidelines, of the Project Site and the surrounding 1-mile area is 34 percent; this area includes part of Tullahoma in Coffee County. The poverty threshold is specified under CEQ guidance for EJ consideration rather than the low-income threshold.

Table 3-21. Poverty in the project area, county, and state

Geography	Per Capita Income, All People	Poverty Rate, All People
CT 9301 BG 1	\$29,708	9.0
CT 9302 BG 1	\$26,739	5.0
Moore County	\$30,658	7.7
Coffee County	\$26,557	14.0
Franklin County	\$28,317	14.4
Tennessee	\$29,859	15.2

Source: USCB 2020e, 2020f, 2020h

3.16.2 Environmental Consequences

This section describes the potential impacts on minority and low-income populations should the Proposed Action or No Action Alternative be implemented. According to CEQ, adverse health effects to be evaluated within the context of environmental justice impacts may include bodily impairment, infirmity, illness, or death. Environmental effects may include ecological, cultural, human health, economic, or social impacts. Disproportionately high and adverse human health or environmental effects occur when the risk or rate of exposure to an environmental hazard or an impact or risk of an impact on the natural or physical environment for a minority or low-income population is high and appreciably exceeds the impact level for the general population or for another appropriate comparison group (CEQ 1997).

3.16.2.1 No Action Alternative

Under the No Action Alternative, TVA would not execute the PPA to purchase the power generated by Moore County Solar, and SR Tullahoma would not develop a solar PV facility at this location; therefore, negligible to minor impacts on minority or low-income populations would occur if current land use practices continued.

3.16.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, TVA would execute the PPA, and SR Tullahoma would construct, operate, maintain, and eventually decommission Moore County Solar. TVA would also construct a switchyard, interconnect the facility to its transmission system, and upgrade portions of an existing TL.

Minority and poverty populations are present in the project area, including the area of the proposed TL upgrades, at generally lower rates than the county and state. The proportion of the population in the project area that is low-income is also lower than the official U.S. poverty rate of 10.5 percent.

The overall impacts of the proposed Moore Solar Facility, as described in other sections in this chapter, most of which would occur during the approximately 18-month construction period, would be minor, and off-site impacts would be negligible. As such, no disproportionately high or adverse direct or indirect impacts are expected to result from the Proposed Action on minority or low-income populations due to human health or environmental effects. Rather, the Project is expected to have positive effects to the local economy that would benefit low-income populations.

3.16.2.2.1 Cumulative Impacts

Demographic characteristics of the project area are expected to change temporarily in response to an increased construction workforce, but this change would not be significant. There is a potential that these communities would be indirectly impacted due to an increase in noise during construction activities of the Proposed Action and RFFAs (Table 3-1). Because these short-term actions may coincide, potential, indirect cumulative impacts may occur on a local basis. Such physical impacts associated with construction activities would be temporary and mitigated through BMPs identified in Section 2.5.

3.17 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of a proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by CEQ and case law.

The Proposed Action could cause some unavoidable adverse environmental effects (Table 2-1). Specifically, construction activities would temporarily increase noise, traffic, and health and safety risks and temporarily affect air quality, GHG emissions, and visual aesthetics of the Project Site vicinity. Mitigation measures are listed in Section 2.5. Construction activities would primarily be limited to daytime hours, which would minimize noise impacts. Temporary increases in traffic would be minimized or mitigated by specific measures designed to address traffic flow issues. Temporary increases in health and safety risks would be minimized by implementation of the Project health and safety plan. Construction and operations would have minor, localized effects on soil erosion and sedimentation that would be minimized by establishment and maintenance of stream and wetland buffers, soil stabilization and vegetation management measures. The buffers would minimize effects to these and other visual resources, during both construction and operation. The Project is anticipated to result in the fill of 490 LF of jurisdictional ephemeral streams for solar panel blocks, the fill of 7,366 LF of non-jurisdictional ditches for road crossings and solar panel blocks, the fill of 1.9 acres of non-jurisdictional open waters for road crossings and solar panel blocks, and the fill of 1.4 acres of wetlands for road crossings and solar panel blocks. The Project would change land uses on the Project Site from primarily forest management with timbering operations and agricultural to industrial solar uses.

With the application of appropriate BMPs, no unavoidable adverse effects to groundwater are expected. Moderate, direct impacts to vegetation would occur by clearing up to approximately 780 acres of trees and other tall vegetation. The Project would affect some state-listed plants and animals, while the majority of state-listed plants on site would be avoided. Three federally listed terrestrial animal species (gray bat, Indiana bat, and northern long-eared bat) have been reported within Moore County. No known caves or suitable winter roosting structures for all three bats exist on the Project Site or in the TL upgrade locations. Streams and ponds offer foraging habitat and sources of drinking water for all three bat species within and adjacent to the Project Site. Consultation with USFWS under Section 7 of ESA is underway regarding potential impacts to federally listed bat species.

3.18 Relationship of Short-Term Uses and Long-Term Productivity

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and uses of water resources. Long-term productivity is the capability of the land to provide resources, both market and non-market, for future generations. In this context, long-term impacts to site productivity would be those that last beyond the life of the Project. The Proposed Action would affect short-term uses of the Project Site by converting it from forest management with timbering operations and agricultural uses to solar power generation. The effects on long-term productivity would be minimal, as existing land uses could be readily restored on the Project Site following the decommissioning and removal of the solar facility. See Section 2.2.4 for additional information on the decommissioning process.

3.19 Irreversible and Irretrievable Commitments of Resources

Irreversible or irretrievable commitments of resources occur when resources would be consumed, committed, or lost because of a project. The commitment of a resource would be considered irretrievable when a project would directly eliminate the resource, its productivity, or its utility for the life of a project and possibly beyond. Project-related construction and operation activities would result in an irretrievable and irreversible commitment of natural and physical resources. The implementation of the Proposed Action

would involve irreversible commitment of fuel and resource labor required for the construction, maintenance, and operation of the solar PV facility. Because the solar arrays and associated on-site infrastructure could be removed and the facility would not irreversibly alter the site, the Project Site could be returned to its original condition or used for other productive purposes once the solar facility is decommissioned. Most of the solar facility components could also be recycled after the facility is decommissioned. See Section 2.2.4 for additional information on the decommissioning process.

CHAPTER 4 - SUBMITTED ALTERNATIVES, INFORMATION AND ANALYSES

During the scoping period, comments were received from the USGS, USEPA, TDEC's Tennessee Natural Heritage Program, Southeastern Grasslands Initiative, and two private individuals. Comments were related to alternatives, purpose and need, agency coordination, mitigation measures, land use, water resources, biological resources, air quality and GHG emissions, socioeconomics, and environmental justice.

As a result of preliminary internal scoping by TVA and comments received during public scoping, TVA determined that, from the standpoint of NEPA, there is one reasonable alternative, the Action Alternative, which meets the purpose and need. As required by NEPA, the EIS also addresses the No Action Alternative. Variations of the Action Alternative that TVA considered are described in Section 2.3. USEPA appreciated TVA's efforts toward developing and analyzing an appropriate amount of alternative project proposals and recommended including details of considered alternatives within the EIS, including dual land use. As presently designed, the solar facility site will be revegetated with a mix of grasses and herbaceous plants and most of the site will be grazed by sheep, accomplishing the dual land use recommendation.

A private individual expressed concern about the Action Alternative being able to meet the purpose and need due to the intermittent availability of solar generation. The purpose and need of the Proposed Action is to increase TVA's solar generating capacity. As discussed in the 2019 IRP, TVA is compensating for the intermittent availability of this solar generation by operating a diverse portfolio of types of generation, an adequate reserve margin to compensate for the loss of individual generating facilities, and a well-maintained interconnected transmission grid (TVA 2019a).

TDEC's Tennessee Natural Heritage Program and Southern Grasslands Initiative recommended that a thorough field inventory of rare species be conducted for the Project area in order to develop avoidance and mitigation measures. TVA compiled lists of rare plants and animals from TDEC, as well as from the USFWS and TVA's RNHD, for the Project area. TVA evaluated potential impacts to biological resources in Section 3.5. This evaluation includes the results of field surveys of biological resources, including the presence of rare plants and animals, suitable habitat for the rare species, and rare natural communities.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

Table 5-1 presents the members of the NEPA project management team and summarizes the expertise of each member and their contributions to this EIS.

Table 5-1. NEPA Project Team

Name/Education	Experience	Project role
TVA		
<i>Ashley Pilakowski</i> B.S., Environmental Management	11 years in environmental planning and policy and NEPA compliance	NEPA Project Manager and Coordinator
HDR		
<i>Harriet L. Richardson Seacat</i> M.A., Anthropology (Cultural); B.A., Anthropology (Native American Studies minor)	20 years in anthropology, archaeology, history, NHPA and NEPA documentation, and project management	NEPA and EIS contractor lead, General oversight and review of analyses per project description/internal finalization, coordination with SMEs, Noise, Draft EIS comment response review, SRC/TVA coordination
<i>Charles P. Nicholson</i> B.S., Wildlife and Fisheries Science M.S., Wildlife Management PhD, Ecology and Evolutionary Biology	17 years in wildlife and endangered species research and management, 26 years in NEPA compliance	Overall NEPA advisor/QC, TVA coordination
<i>Miles Spenrath</i> B.S., Environment and Natural Resources	10 years in NEPA compliance and documentation	GIS mapping; Past, Present, and RFFAs write-up; Land Use; Soils, Prime Farmland; Visual Resources; Utilities; Public H&S; Transportation; Draft EIS comment management
<i>Erica Wadl</i> M.S., Forestry; B.S., Biology	15 years in environmental permitting, land management, and NEPA compliance	Former NEPA contractor lead; Development of the NOI and scoping report

Table 5-2. Other Contributors

Name/Education	Experience	Project Role
TVA		
<i>Todd Amacker</i> M.S., Wildlife and Fisheries Science; B.S., Environmental Science	10 years working with threatened and endangered aquatic fauna in the Southeast; 5 years in environmental reviews	Aquatic Life, Threatened and Endangered Species
<i>Adam Datillo</i> M.S. Forestry B.S. Natural Resource Conservation Management	22 years of experience in ecological restoration and plant ecology and 17 years in botany	Vegetation, Threatened and Endangered Species (Plants)
<i>Elizabeth B. Hamrick</i> M.S., Wildlife; B.S., Biology	21 years conducting field biology, 10 years in biological compliance, NEPA compliance, and ESA consultation for T&E terrestrial animals	Terrestrial zoology
<i>Michaelyn Harle</i> Ph.D., Anthropology; M.A. Anthropology; B.A. Anthropology	17 years in cultural resource management	Cultural Resources, NHPA Section 106 compliance
<i>Joseph Melton</i> B.S., Environmental Health and Science	20 years in TVA environmental support for transmission power systems	Program Manager, Transmission Projects Environmental Support
<i>Carrie Williamson, P.E., CFM</i> M.S. Civil Engineering B.S. Civil Engineering	9 years in floodplains and flood risk, 3 years in river forecasting, 11 years in compliance monitoring	Floodplains and Flood Risk
HDR		
<i>G. Noemi Castillo, P.E., PMP</i> B.S., Environmental Engineering M.S., Environmental Engineering	18 years in NEPA documentation, NEPA compliance, noise analyses and air quality analyses	AQ/GHG Emissions, Chapter 4
<i>Andrew Clay</i> MURP, Urban and Regional Planning B.A., Political Science, International Relations	14 years in environmental planning	Noise
<i>Mark P. Filardi, P.G.</i> M.S. and B.S., Geology	19 years in hydrogeology and contaminated site assessment and remediation	Geology, Groundwater, Waste
<i>Josh Fletcher, RPA</i> M.A., Anthropology (Archaeology); B.S., Architectural Design	24 years in cultural resources management, regulatory compliance, NEPA documentation, and project management	Cultural resource studies, document preparation
<i>Diana Gu</i> B.S. Natural Resource Conservation and Political Scientist	3 years in field biology and 4 years in environmental consulting.	Wetland/stream delineations and protected species habitat assessments

Name/Education	Experience	Project Role
<i>Gracelyn Jones</i> B.A., Environmental Sociology	3 years in regulatory compliance, NEPA compliance, and document preparation	Coordination with EIS project manager/SMEs, Chapters 1 and 2, EIS compilation/language consistency/acronyms, Socioeconomics, Environmental Justice, Appendices, Admin record, Draft EIS comment management
<i>Amanda B. Mills</i> M.S. in Marine Sciences B.S. in Biology	15 years in geology, biology, geology	Geology, Groundwater, Waste
<i>Al Myers</i> Completed credits toward B.S. Business Administration	24 years in administration	Overall formatting, appendices compilation, ADA Section 508 compliance, and PDF creation
<i>Lyranda Thiem</i> M.S. Biology B.S. Biology	4 years in ecology and biology and 2 years in stream and wetland delineations, permitting, and habitat evaluation	Biology, Water, Natural Areas, Parks, and Recreation; References; Admin record
<i>Karsen Williams</i> B.S., Environmental Science M.S., Coastal, Marine, and Wetland Studies	4 years in environmental consulting	Field survey lead; Wetland/stream delineations and protected species habitat assessments

CHAPTER 6 – LITERATURE CITE D

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Appendices Provided Separately Due to Size

Appendix A – Correspondence and Supporting Information

Appendix B – Scoping Documentation

